PAMS Technical Documentation
RAE-3 Series PDA

7. Service Software Instructions

Issue 1 06/01
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AMENDMENT RECORD SHEET

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Service Software

General

Wintesla software is used to perform service functions of the RAE–3 PDA. This SW consists of Wintesla service software and product specific DLL's (Dynamically Linked Libraries).

To run WinTesla SW, a parallel port software protection device (PKD–1) must be connected to the PC to perform flashing functions. If only controls are necessary, RAE–3 can be controlled using equipment setup described in the WinTesla RS chapter.

The test functions send test messages from PC to MS and receive results and show them in the PC display. The messages to the phone can be sent via DAU–9C cable.

Note: if this software is to be run on laptops, the power saving feature MUST be switched off.

Hardware requirements for Windows 3.1x

The recommended minimum hardware standard to run Service Software is any computer which is 386 33 MHz or greater with at least 4 MB of memory and VGA type display (640 x 480). This assumes that only the WinTesla with After Sales Support Modules is active, i.e. other Windows packages are not running in the background.

Hardware requirements for Windows 95

The recommended minimum hardware standard to run Service Software is any computer which has Pentium processor, memory 8 MB and meets HW requirements recommended by Microsoft.

Software Environment of the Support Modules

The Service Software user interface is intended for the following environments: Microsoft Windows 3.1x (enhanced mode) and Windows 95/98 and NT. Detailed information about Windows and application usage can be found from the Microsoft Windows Users Guide.

As an ordinary Windows application, the main idea in the user interface is that selections are made with menus, push buttons and shortcut keys. Selections can be done by using keyboard and/or mouse. There is always a status bar displayed at the bottom of the main window which contains information about current actions.

Required Servicing Equipment

- Computer: At least IBM 80386 or compatible with one unused serial port (COM1 or COM2) *), one parallel port (LPT1), hard disk recommended
- Operating System: DOS Version 3.2 or later
- If PCLStart in use: DOS 6.22 and IBM 80486 or compatible
- Display: Any 80–character text display
- Service software version for 3.5" disk (product code: 0774080)

Rest of the needed service equipment depends on what kind of operations service personnel wants to perform.

*) Note: A number of PC's of an older generation use the Intel, National Semiconductor, or United Microelectronics IC 8250 as the serial port UART. This is a comparatively inefficient circuit for current purposes and does not necessarily support the M2BUS adapter at 9600 baud. The newer UART's NS16450 and NS16550AF of National Semiconductor offer solutions for these problems.

Installation

Mechanical Connections

Caution: Make sure that you have switched off the PC and the printer before making connections.

Caution: Do not connect the PKD–1 key to the serial port. You may damage your PKD–1 !

The software controls RAE–3 via a separate adapter connected to the serial port of the PC, and to the phone bottom connector (DAU–9C cable).

Attach the dongle PKD–1 to the parallel port 1 (25–pin female D–connector) of the PC. When connecting PKD–1 to the parallel port, be sure that you insert the computer side of the PKD–1 to the PC (male side). If you use a printer on parallel port 1, install the PKD–1 between the PC and your printer cable.

The PKD–1 should not affect devices working with it. If some errors occur (errors in printing are possible) please try printing without the PKD–1. If printing is OK without the PKD–1 please contact your dealer. We will offer you a new PKD–1 in exchange for your old one.

The program is delivered on a diskette and is copy protected with a dongle PKD–1. It must be present in parallel port when using Service software.

Installing the software on PC Hard Disk

The program can also be installed on the hard disk, which is recommendable to obtain a maximum data access rate.

Keep the original diskette safe to enable upgrading of the program !

If you plan to use PCL Start service software, you must install it before installing Service software, see PCL Start installation instructions.

To install the new Service software program, follow the steps below:

1.	insert the new Service software diskette into drive A: of your computer	
2.	start Windows, and open File Manager	
	log into drive a:	*type* **A:** *and press <Enter>*
3.	start INSTALL.EXE and install Service software to drive C:	*type* ***C:*** *and press <Enter>*

To install product specific DLL's, take your RAE–3 DLL disks, and repeat the steps above.

Common Properties of the User Interface

This chapter describes how the User Interface CLF must appear to the user.

The User Interface MUST be capable of being driven without the use of a mouse, as the service engineer rarely has space on the bench to use a mouse.

Login Dialog

When the Service Software application is invoked, by checking on the Service Software icon, the **Login** dialog box (Figure 1) will be displayed on the screen.

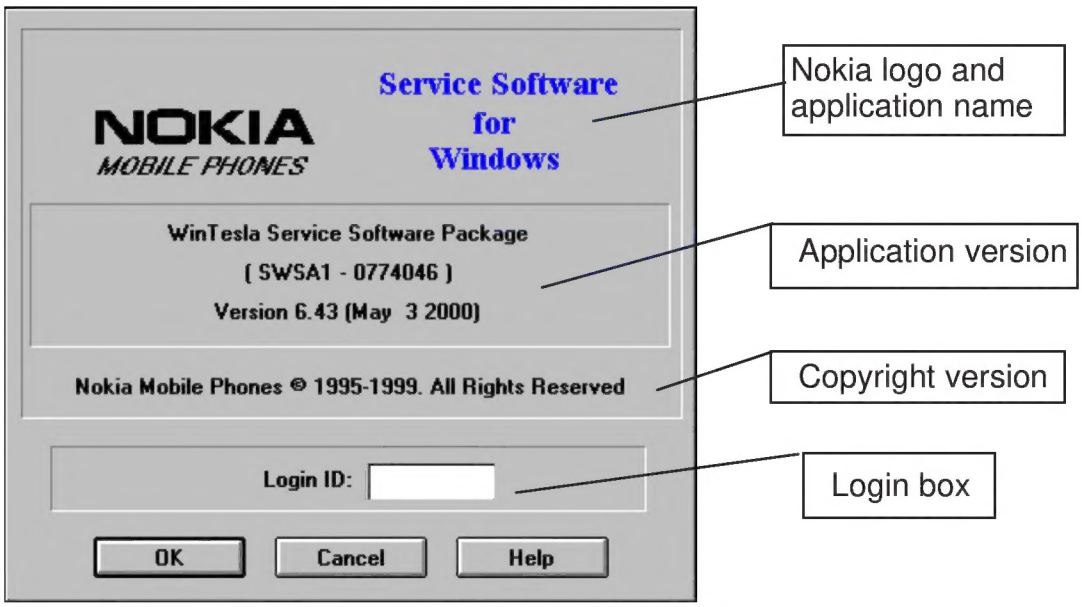

Figure 1. Login dialog box

Nokia logo and application name bitmap (–)

Displays Nokia logo and name of the application.

Application version static text (–)

Contains the name and version of the application.

Copyright notice static text (–)

Copyright is informed as: "**Nokia Mobile Phones (c) 1995–1999. All Rights Reserved**".

Login Box edit box (–)

The user Login ID edit box, where the user enters his faultlog user name. (See Faultlog User Guide)

OK button (default key)

The user name is stored in memory and the dialog box is closed. When the dialog box is closed, the application starts.

Cancel button (ESC)

The Dialog box is closed and application is started, but the Faultlog feature is disabled.

Help button (F1)

Activates the Windows Help application and displays context sensitive Help.

Main Window

When Wintesla opens the basic screen, product specific DLL's must be activated using mouse to select Product –> Open and select RAE-3

Using Help

When DLL's are active, the menu bar contains several items, including help texts, as shown in Figure 2.

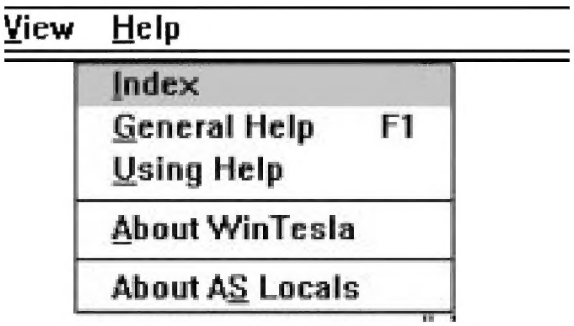

Figure 2. Menu bar

Instructions for service software use can be found in the help texts. Step by step instructions for complex operations like SW upgrades and tunings can be found in the end of this chapter.

RAE-3 software upgrade guide

Equipment Setup instructions

1. Once a FPS–8 box is used for the first time it has to be activated according to the instructions included in the FPS–8 package.
2. Connect the box, cables and PC according to the drawing (see Figure 3)

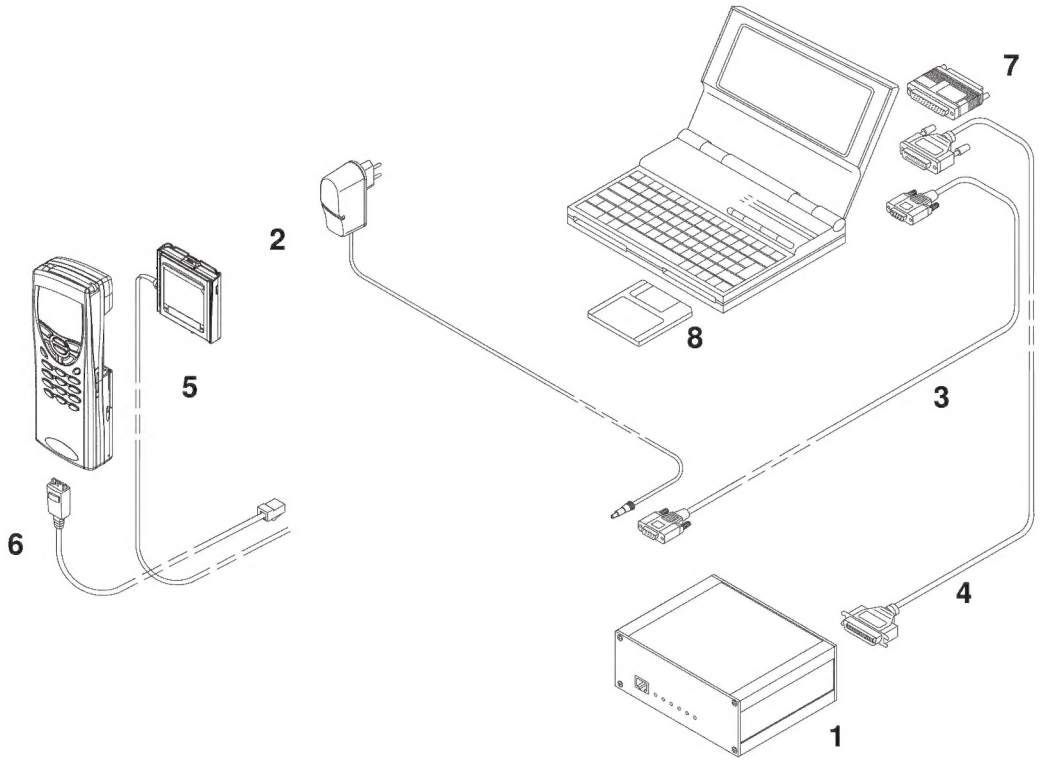

Figure 3. Flashing setup

Item:	Service accessory:	Type	Product code:
1	Prommer	FPS–8	0750123
2	AC/DC Adapter FRIWO (Included in FPS–8 sales pack)		
		FW7207/6	0680032
3	D9 – D9 Cable (Included in FPS–8 sales pack)		
		AXS–4	0730090
4	Printer Cable (Included in FPS–8 sales pack)		0730029
5	Service Battery	BBL–3B	0770206
6	Service Cable	SCH–8	0730137
7	Software protection key	PKD–1	0750018
8	Service SW diskette 3.5” for Wintesla		0774046
9	Service SW diskette 3.5” for RAE–3		0775293

Setting up the PC

1. Install dongle drivers from CD-ROM (d:\32bit_Dongle_Driver\dk2wn32.exe –directory)

2. Install WinTesla version (version 6.43 or later) from CD-ROM (d:\wintesla\wt_inst.exe –directory)

3. Install the RAE–3 DLL's from CD-ROM (d:\dlls\v30_80_00\Disk1\setup.exe –directory)

Setting up BUS Configuration for WinTesla

Once Wintesla is first time used the Connection from PC to FPS–8 has to be configured according to the instructions bellow (see Figure 4, Figure 5).

1. Start WinTesla software (c:\WinTesla\Stesla.exe)

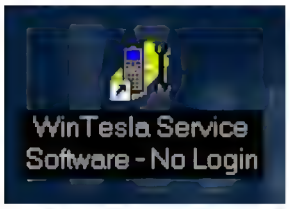

Figure 4.

2. Set Bus Configuration for WinTesla according to Figure 2 below:

Open Bus Configuration –window by going "**Configure**" –> "**Buses**..."

Set COM port "**1**" , Hardware Type "**COMBOX**" and Media "**MBUS**" (see Figure 5).

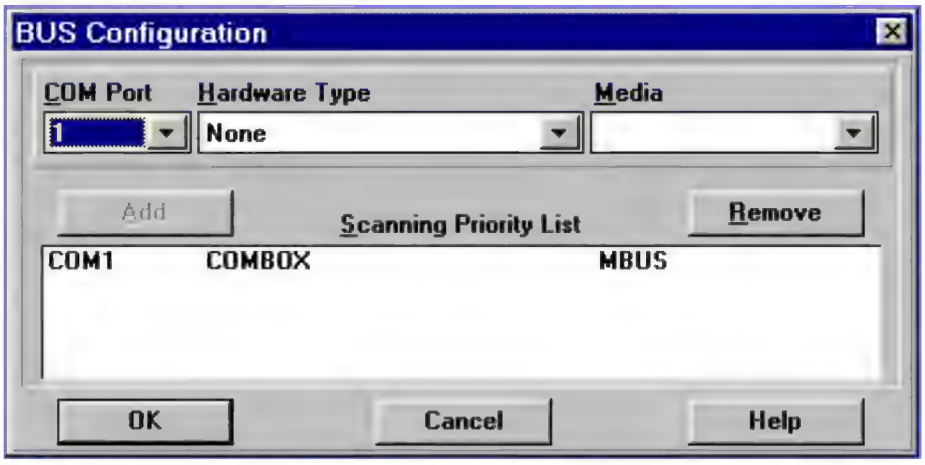

Figure 5. Set Bus Configuration

Programming with WinTesla Interface

When the system has been setup, SW upgrade can be performed according to following instructions.

1. Insert BBL–3B service battery.

2. Connect SCH–8 cable from FPS–8's **"service cable"** connector to N9210's bottom connector

3. Connect power cable to FPS–8's **"service battery"** connector.

4. Start WinTesla software

5. Select Product –> Open –> RAE–3 (or if WinTesla is already running and N9210 is on Press **"F5"** to initialize connection (see Figure 6)

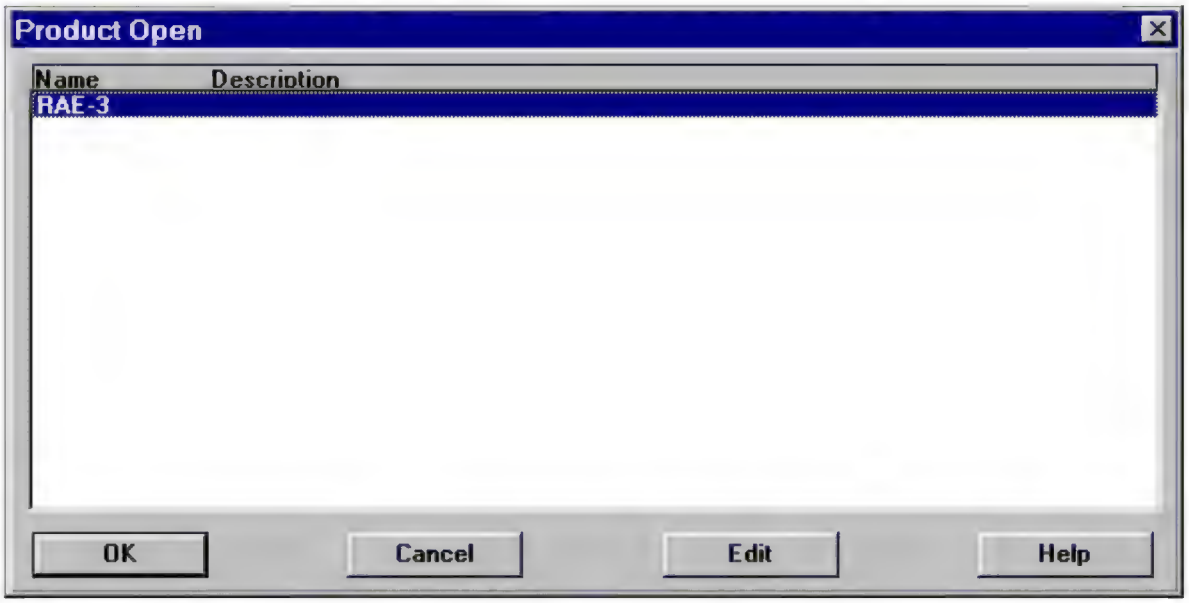

Figure 6. Product Open

6. Select Dealer –> Flash Phone…

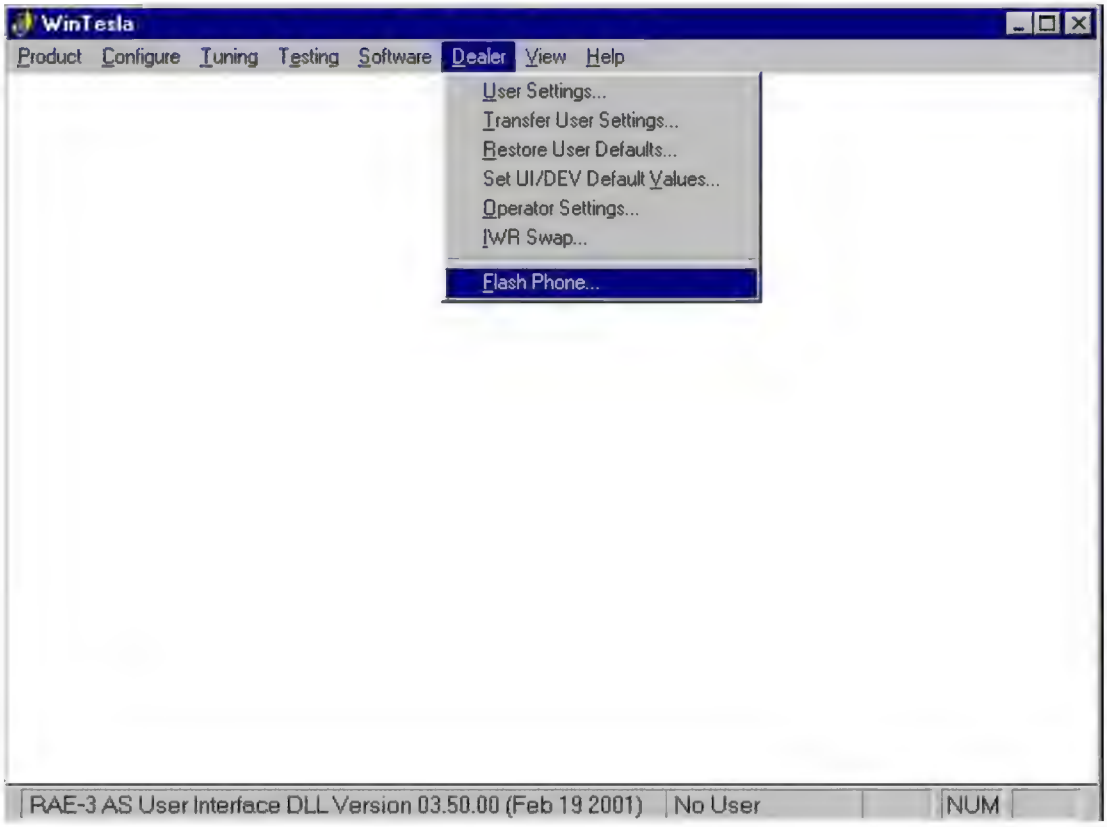

Figure 7. Wintesla user interface when the RAE–3 is running and initialization has been successful.

8. Flash Phone dialog opens. Select the correct language in the .... Market Area box.

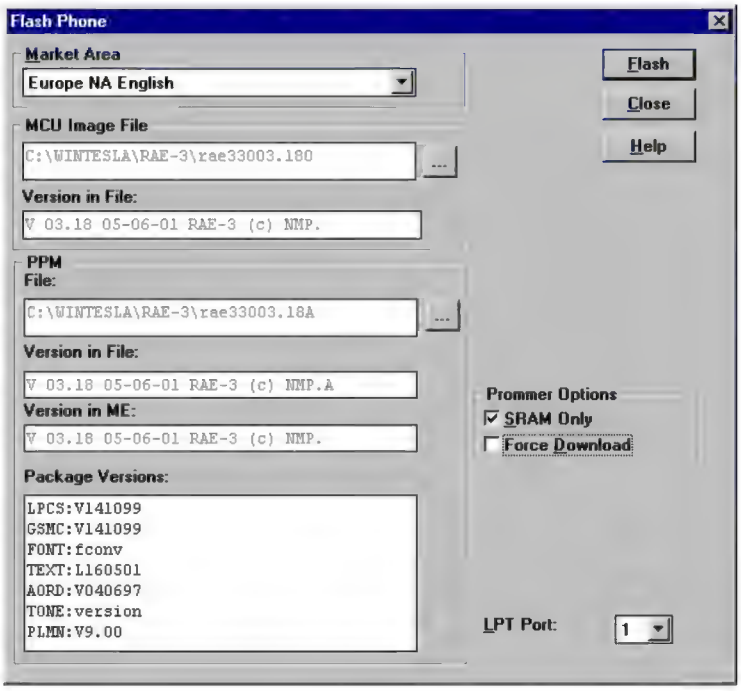

Figure 8. Flash phone –dialog

9. Press "**Flash**" button (see Figure 8)

10. Once the program is prompting for restoring user data choose YES if you want to save user settings to file. (see Figure 9)

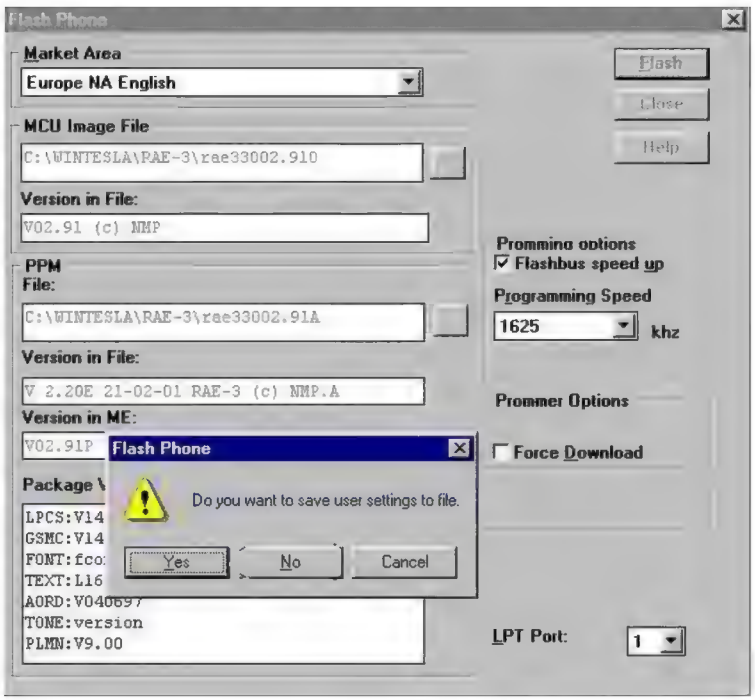

Figure 9. Saving user settings to file

11. Programming starts (takes about 6 minutes if the images already are stored in the Prommer memory)

12. Flash authority ID, Factory setup values and users settings (optional) are updated automatically.

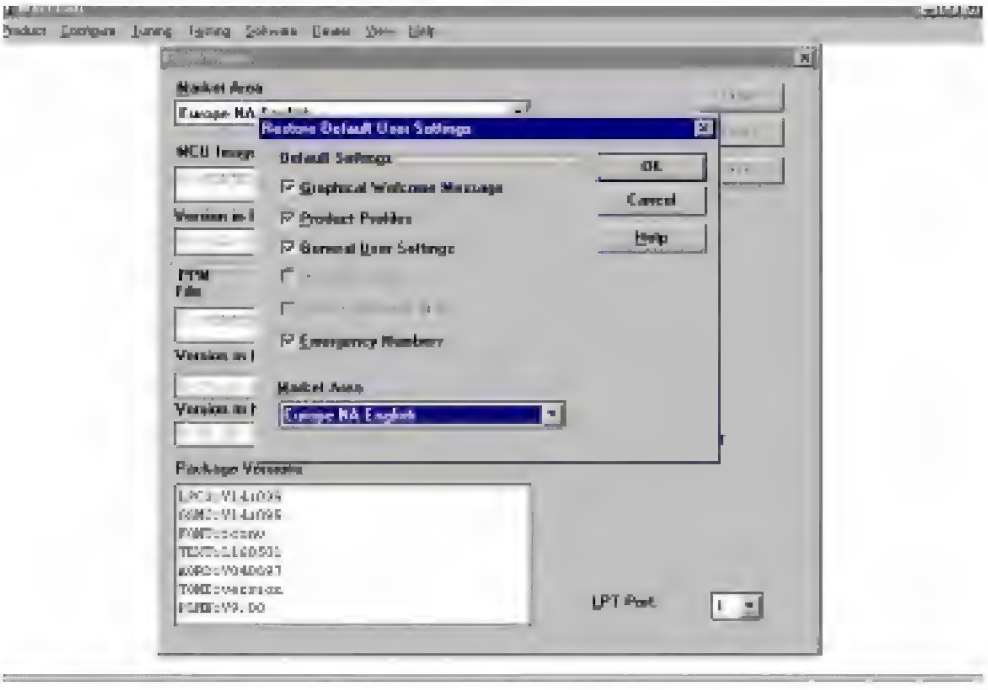

Figure 10. Restoring Default User settings

13. After Flash programming complete message you can close the flash dialog (see Figure 11)

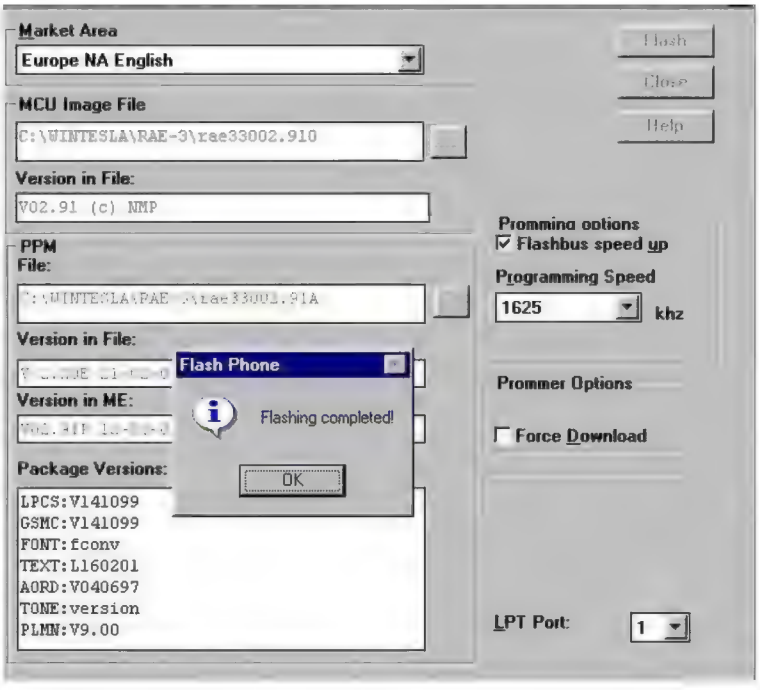

Figure 11. Flash programming completed

14. Disconnect RAE–3

Troubleshooting for the N9210 SW upgrade

If something went wrong during flashing:

If you have a dead RAE–3

1. Do not try to switch phone on

2. Use product–> Open–> RAE–3. (Figure 12)
Wintesla will prompt you " Did not find a phone in current connection! " Answer Yes.

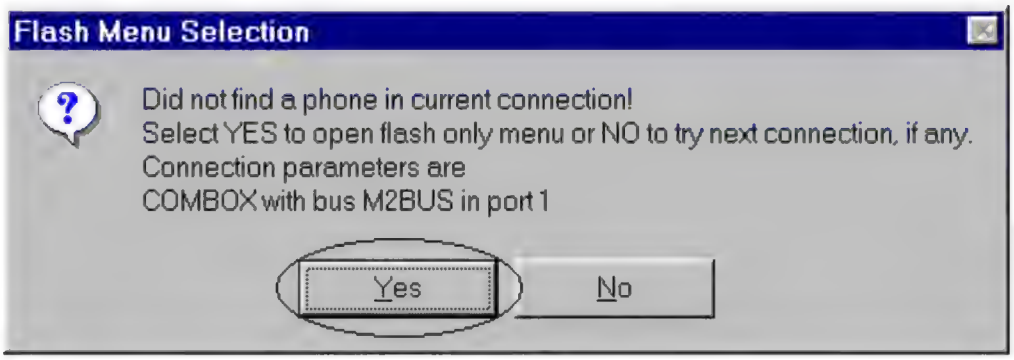
Flash Menu Selection
Did not find a phone in current connection!
Select YES to open flash only menu or NO to try next connection, if any.
Connection parameters are
COMBOX with bus M2BUS in port 1
Yes
No

Figure 12. Flash menu selection

3. Then use Dealer > Flash Phone

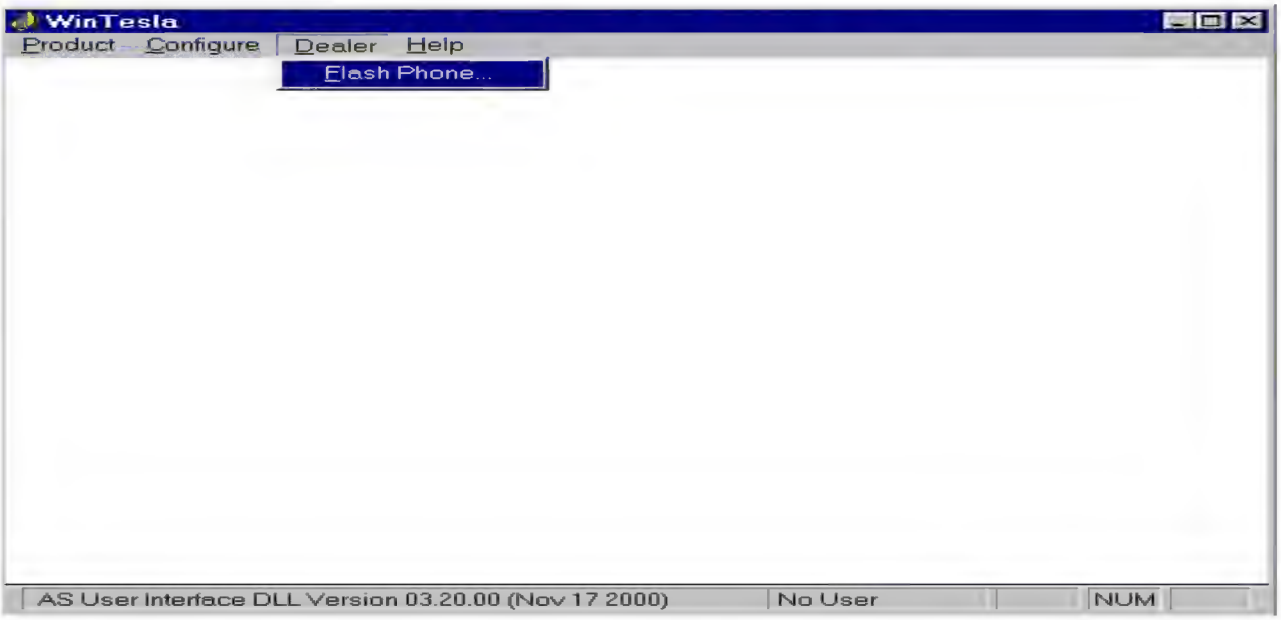

Figure 13. Wintesla dialog when the RAE–3 is not running

4. Because user settings cannot be read, Wintesla will prompt you " Failed to communicate with phone. Settings cannot be saved. Do you want to continue? " Answer Yes.

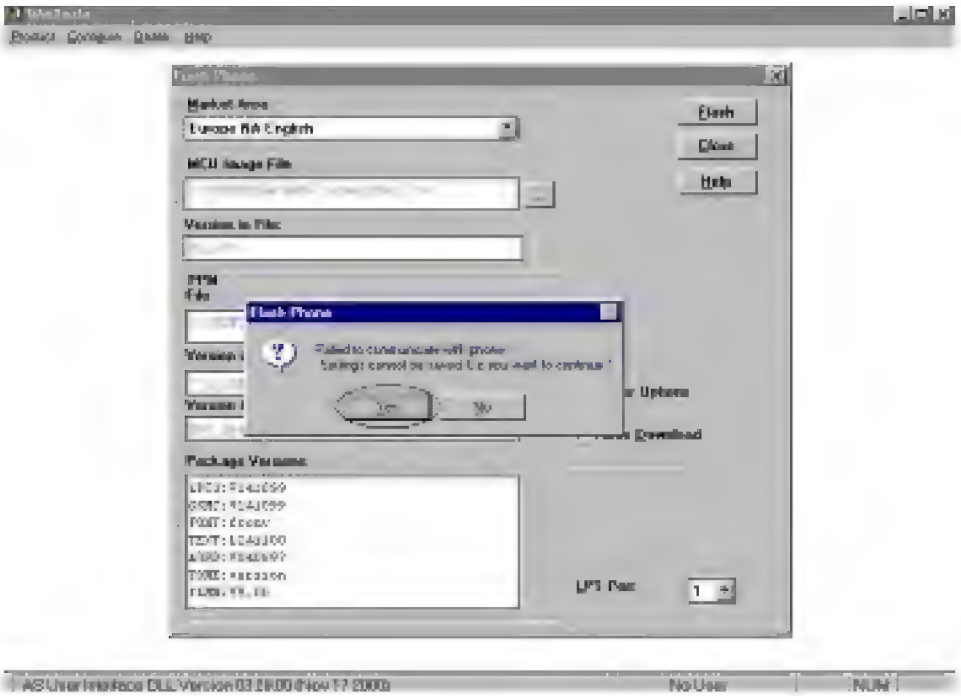

Figure 14. Wintesla cannot read user settings

5. If Flash authority ID writing fails ( ) after flashing:
. . . . . FPS–8 may not be activated,

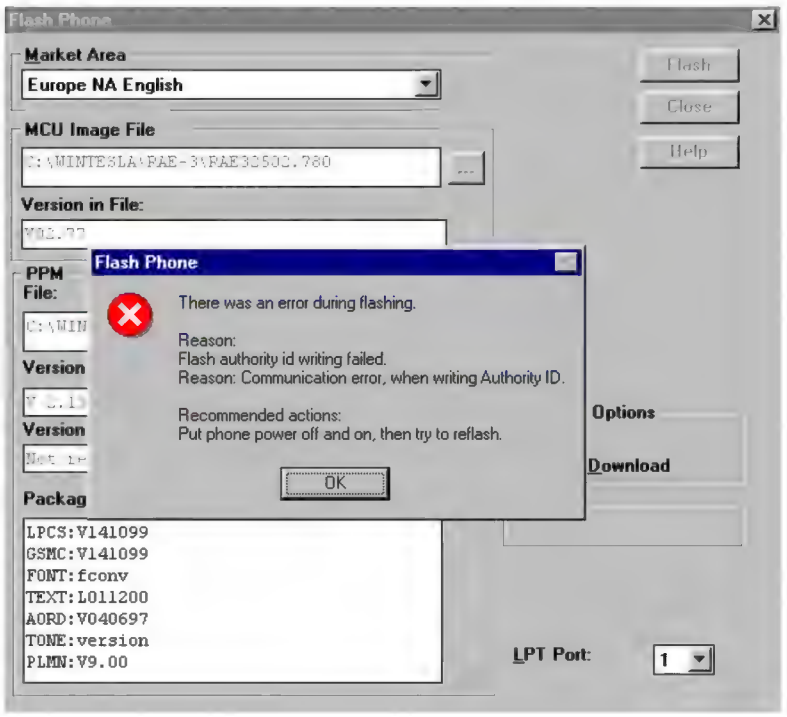

Figure 15. Flash authority ID writing failed

Wintesla Tuning

Prior to any tuning the phone must be initialized:

Connect the phone to a PC with a DAU–9P cable

Start Wintesla–Service–Software and

Select	Product			Alt+p
		Open…		
			RAE–3	
Select:	Product			Alt+p
		Initialize		Alt+I
			Normal Mode	F5

RF tuning after repairs

Different repairs require different tuning. In general it is necessary to determine in which section the repair was done to establish which tunings to perform. To determine if RF tuning is necessary after repair it is important that the functionality of the repaired circuit is understood well. In case the circuit is not fully understood it might be wise to play it safe and do RF tunings in accordance with the table below.

In general repairs in the TX part will require tuning of "TX Power" and "TX I/Q" tuning.

In general repairs in the RX part or PLL will always require "RX Calibration" and in some cases require AM Suppression tuning (Automatic) and RX Filter Calibration (Automatic).

Other parts interfacing to TX, RX or PLL might require tuning, but common sense should be used.

If it can be ruled out that a component change affects RF performance, e.g. the microphone B200, there is no need to do any RF tuning.

Equipment Setup for RF Tuning without Removing Covers

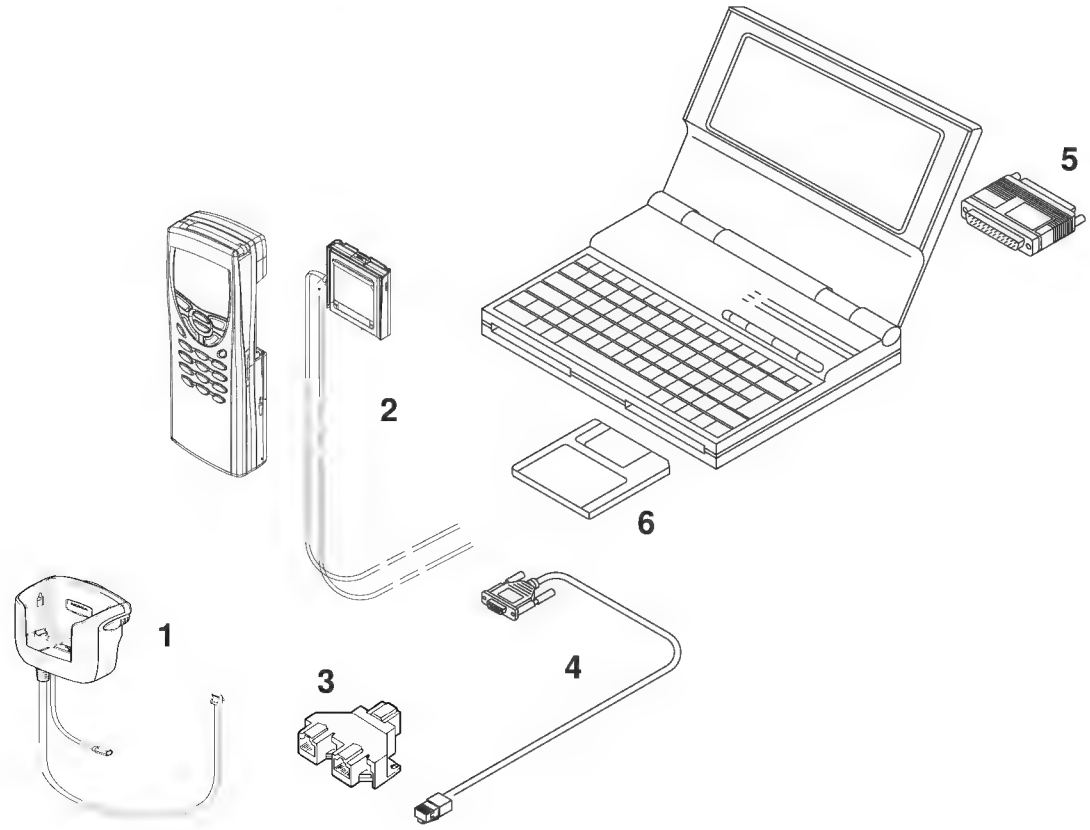

Figure 16. Tuning set–up 1

Item:	Service accessory:	Type	Product code:
1	Service car kit	HCL–1	0770265
2	Service Battery	BBL–3B	0770206
3	Modular T–Adapter		4626134
4	Service MBUS Cable	DAU–9S	0730108
5	Software protection key	PKD–1	0750018
6	Service SW diskette 3.5” for Wintesla		0774046
7	Service SW CD for RAE–3		0775291

RX Calibration

The "RX calibration" is used to determine gain at different gain–settings for front–end and Hagar and needs to be done in both bands, but the calibration only have to be started once, it will automatically proceed to the PCN band after EGSM.

Select: Tuning Alt+t

RX Calibration r

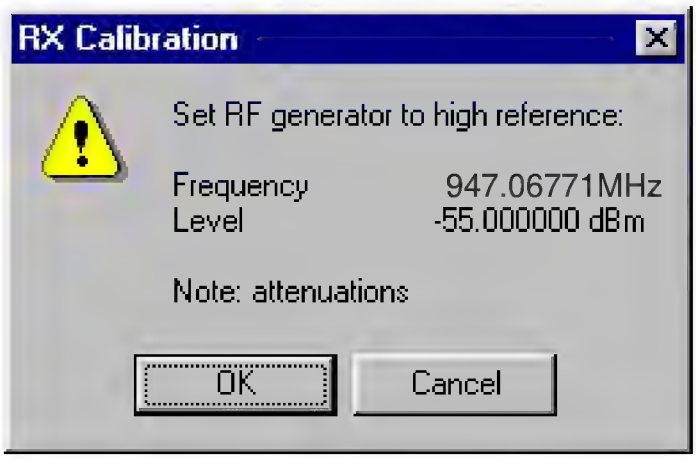

Figure 17.

Note: *Always use the latest Wintesla support DLLs*

Connect an external generator to the phones RF connector and set the generator as the window tells you.

Click OK in the Wintesla window, now a new window pops up:

Change the level on the generator as the window tells you.

Click OK in the Wintesla window, now a new window pops up:

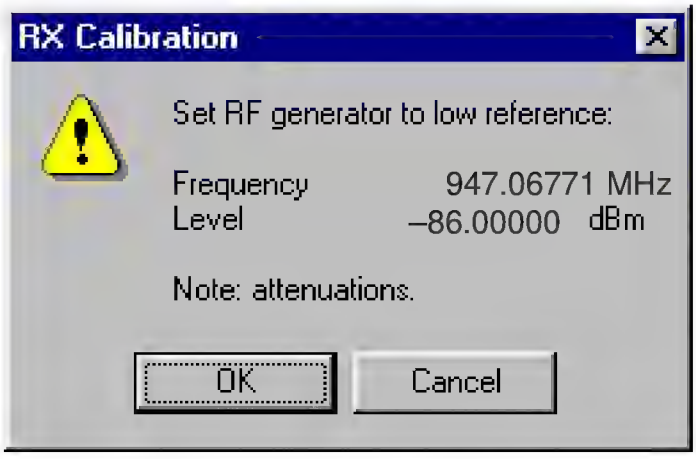

Figure 18.

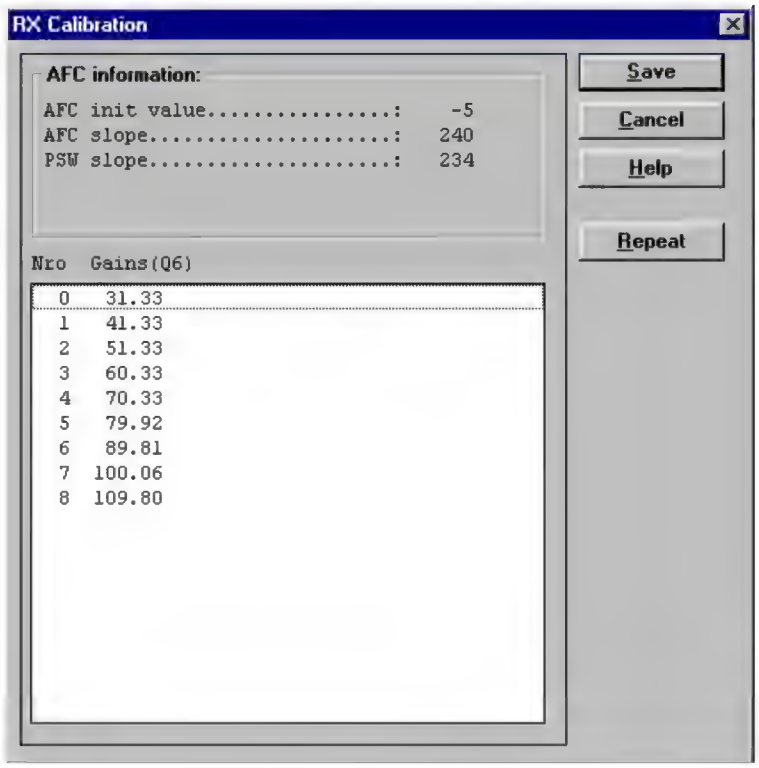

Figure 19.

Difference between the gain steps should be ~10dB±1dB .

Change the level and frequency on the generator as the window tells you.

Click OK in the Wintesla window, now a new window pops up:

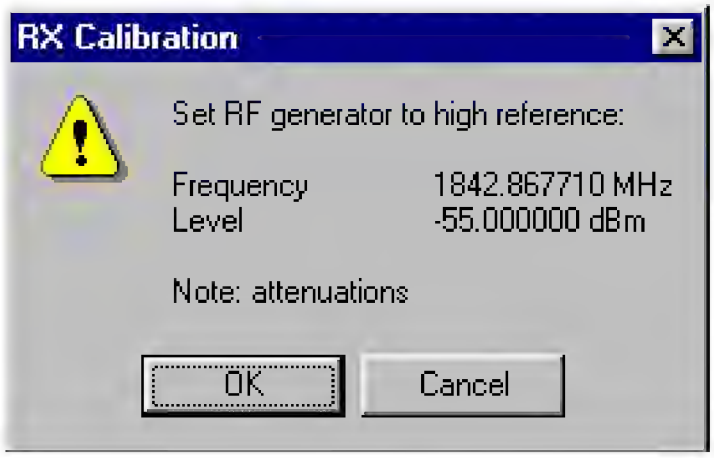

Figure 20.

Change the level and frequency on the generator as the window tells you.

Click OK in the Wintesla window, now a new window pops up:

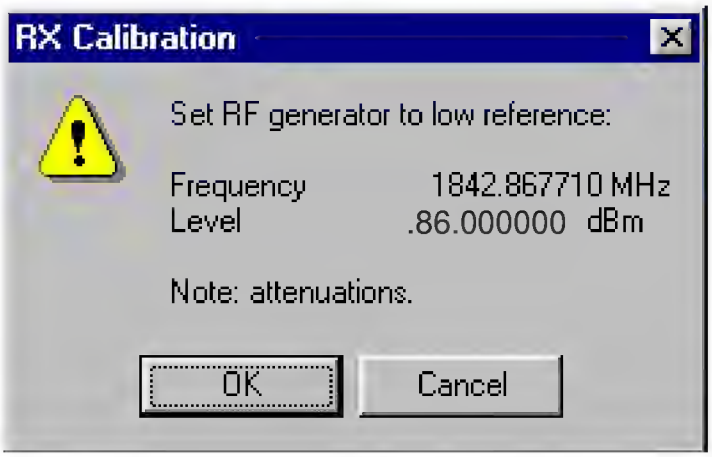

Figure 21.

Change the level and frequency on the generator as the window tells you.

Click OK in the Wintesla window, now a new window pops up:

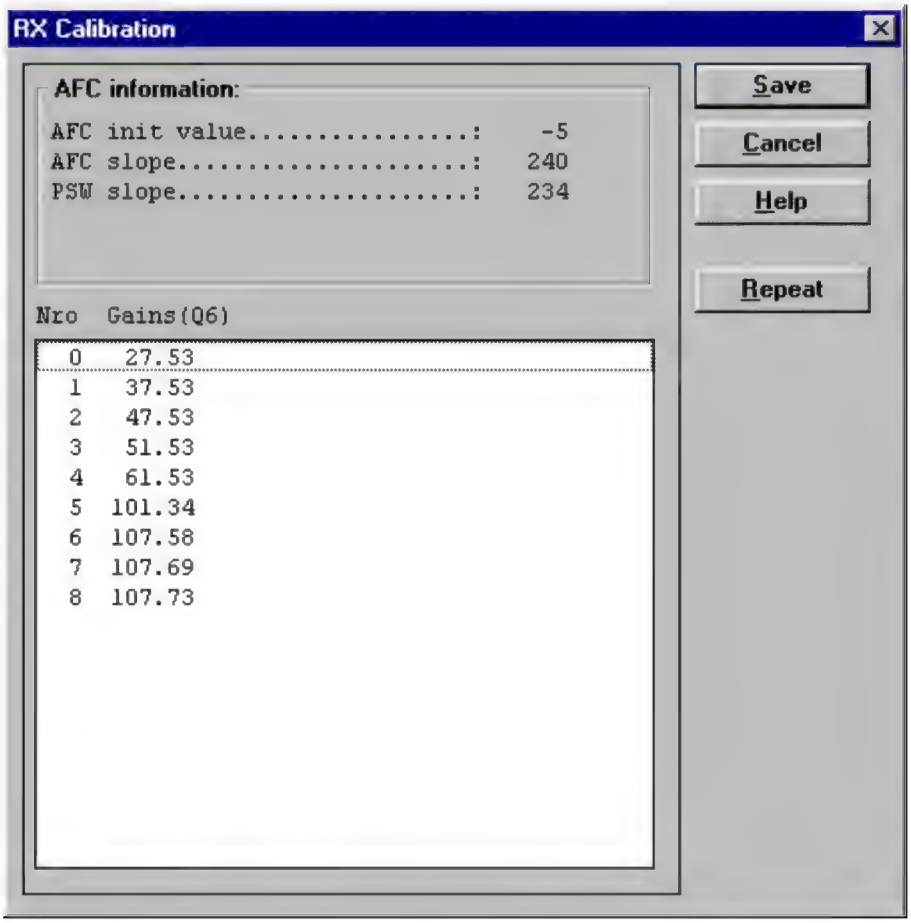

Figure 22.

Difference between the gain steps should be ~10dB±1dB .

Click Save in the Wintesla window.

RX calibration is now completed.

RX Filter Calibration (Automatic)

This calibration is calibrating the Baseband filter inside Hagar, for this reason the calibration is not done in both bands.

Select: Tuning Alt+t
RX Measurements

A window now pops–up:

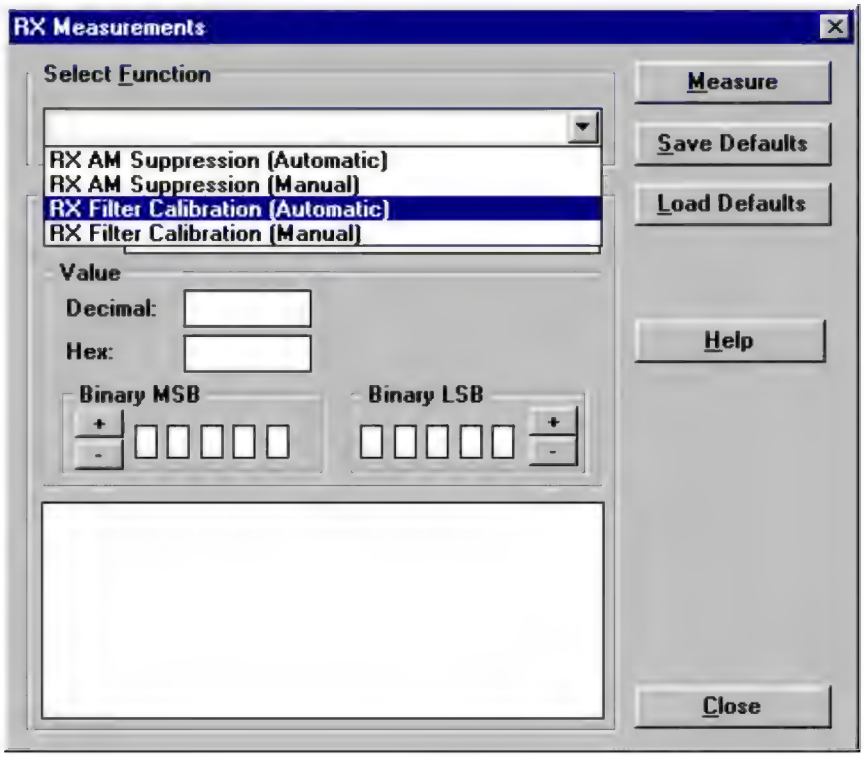

Figure 23.

In the ”Select Function” frame select RX ”Filter calibration (Automatic)”. No external signal is needed for this, just click ”Measure”, wait a few seconds and then click ”Save Defaults”.

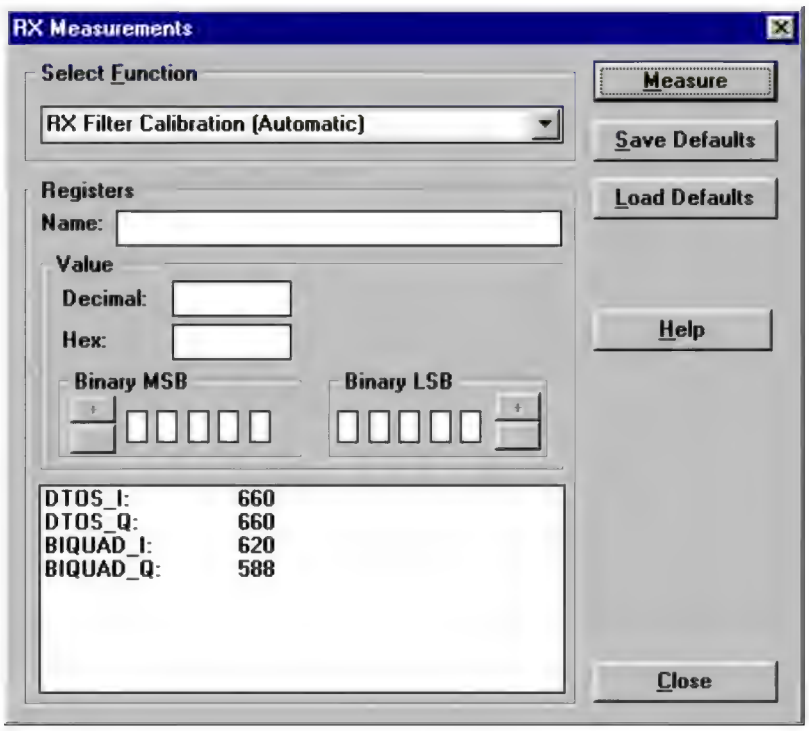

Figure 24.

RX filter calibration is now completed and the "RX Measurements" window can be closed by clicking "Close"

RX AM Suppression (automatic)

This calibration is tuning the AM suppression performance of Hagar mixers and will have to be done in both bands. If flash or Hagar have been replaced or Full Factory settings have been performed RX AM Suppression must be done.

EGSM

Select:	Product		Alt+p
	Band		b
		EGSM	e
Select:	Tuning		Alt+t
		RX Measurements	

A window now pops–up:

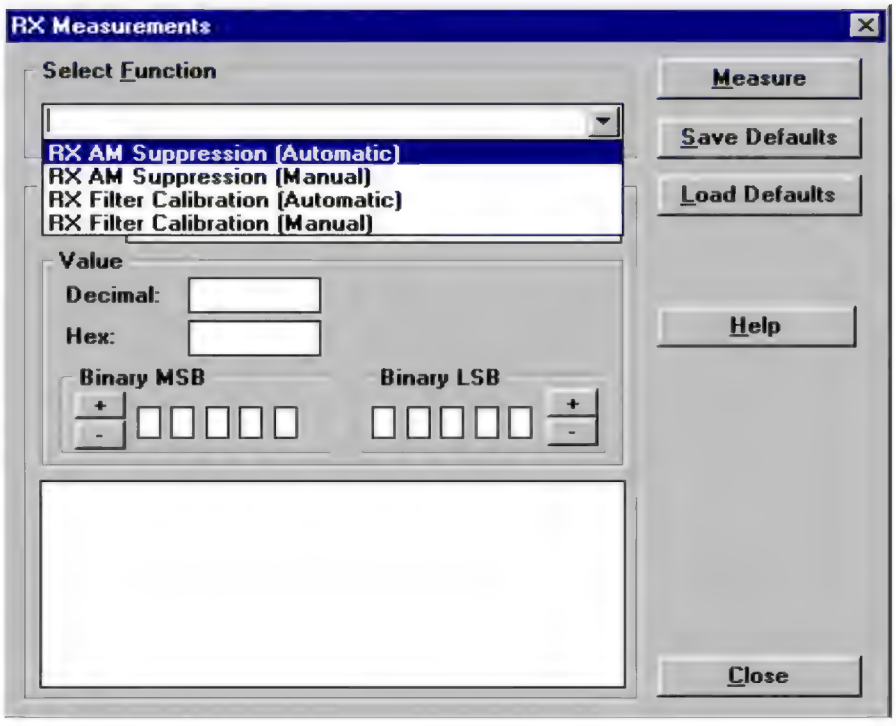

Figure 25.

In the ”Select Function” frame select RX ”RX AM Suppression (Automatic)”.

Click Measure, A window now pops–up:

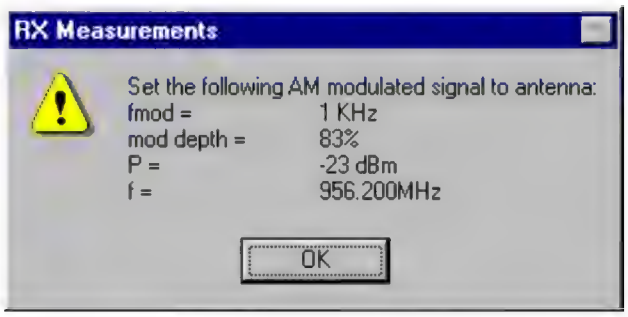

Figure 26.

Note: *Always use the latest Wintesla support DLLs*

Connect an external generator to the antenna connector of the phone and set–up the generator.

Click OK in the Wintesla window, the RSSI value is updated in the RX Measurements window.

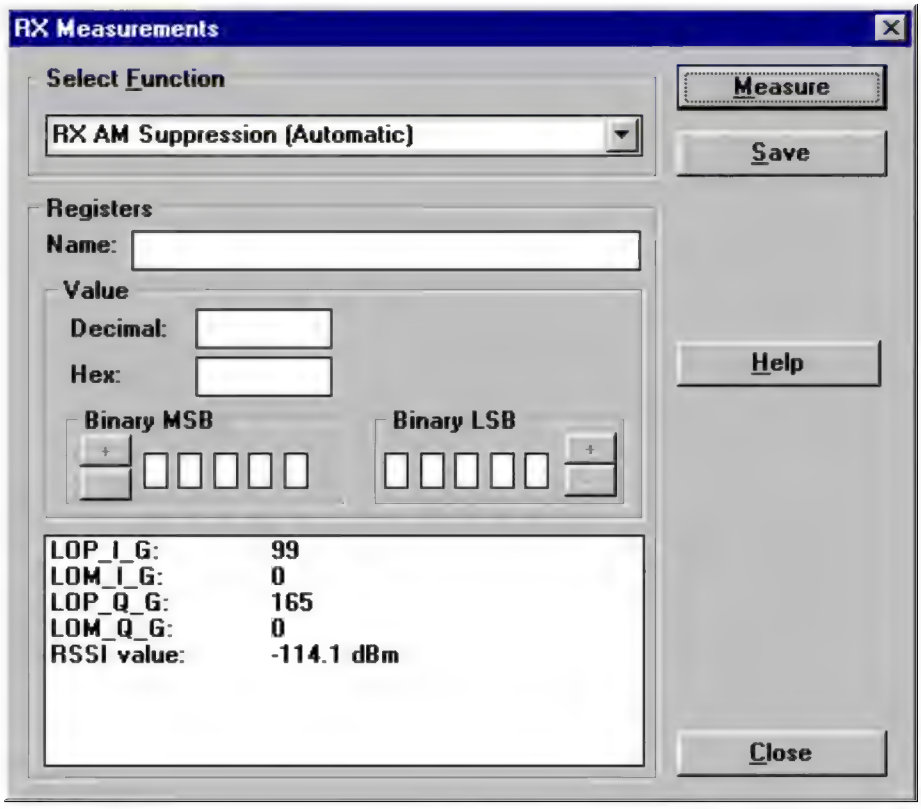

Figure 27.

Click "Save ". The "RX AM suppression tuning" is now completed in EGSM.

PCN

Select:	Product		Alt+p
	Band		b
		PCN	p
Select:	Tuning		Alt+t
		RX Measurements	

A window now pops–up:

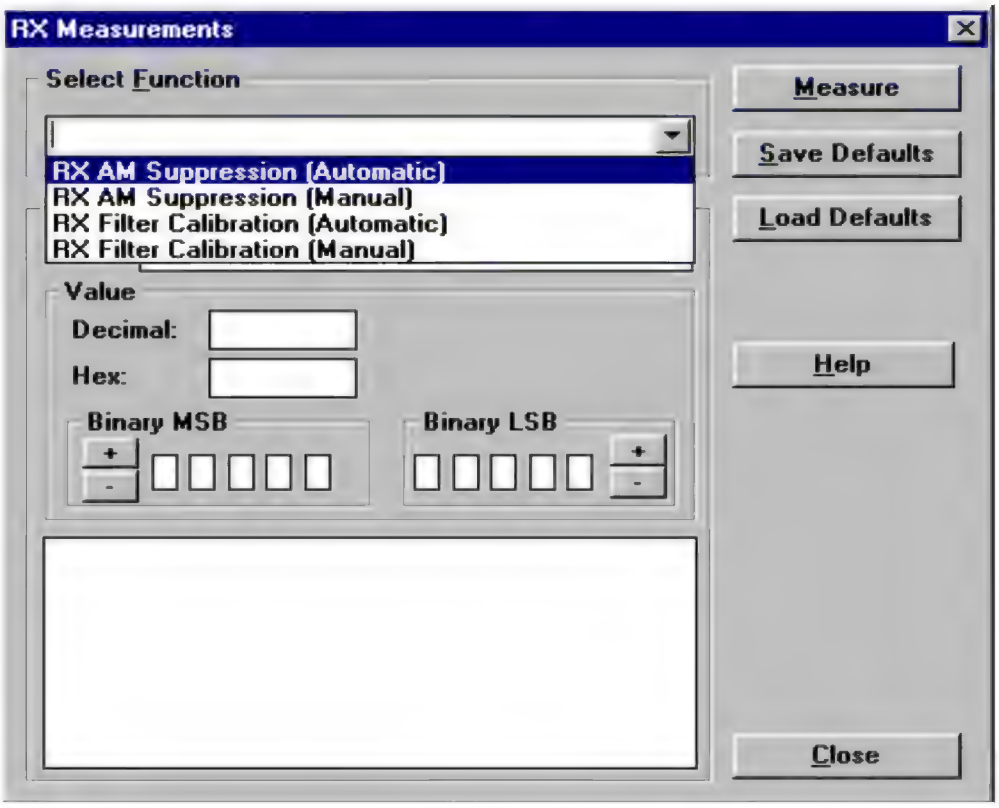

Figure 28.

In the ”Select Function” frame select function ”RX AM Suppression (Automatic)”
Click Measure, A window now pops–up:

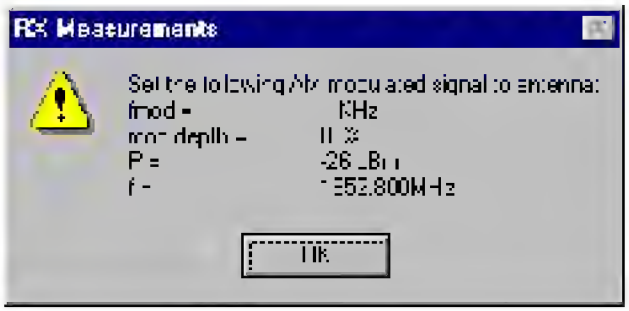

Figure 29.

Note: *Always use the latest Wintesla support DLLs*

Connect an external generator to the antenna connector of the phone and set–up the generator.

Click OK in the Wintesla window, the RSSI value is updated in the RX Measurements window.

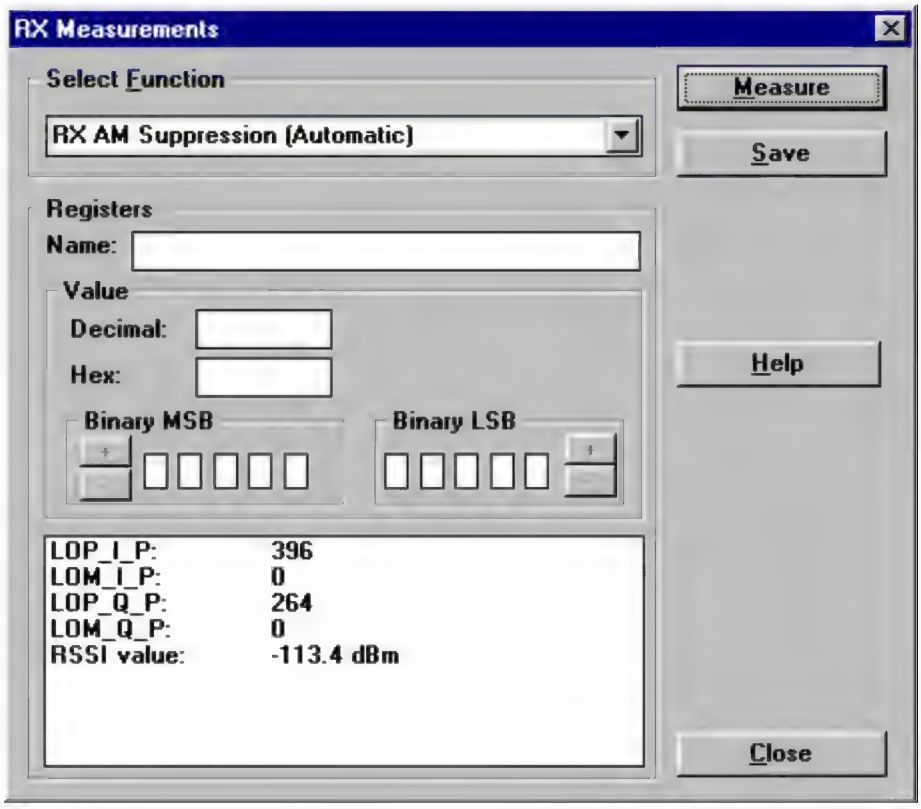

Figure 30.

Click ”Save ”. The ”RX AM suppression tuning” is now completed in PCN.

TX Power Tuning

This tuning must be done in both bands.

Note: *TX Power tuning must be done with a peak power meter, e.g. Rohde & Schwarz model NRVD with a Rohde & Schwarz Peak Power Sensor TDMA Model NRV–Z31 and a suitable attenuator.*

The use of power meter in GSM testers is likely to cause larger error than the use of a dedicated power meter and might cause the phone to be non–compliant with GSM specifications.

EGSM tuning

Select:	Product	Alt+p
	Band	b
	EGSM	e
Select:	Testing	Alt+e
	RF Controls	r

A window now pops–up (Figure 31):

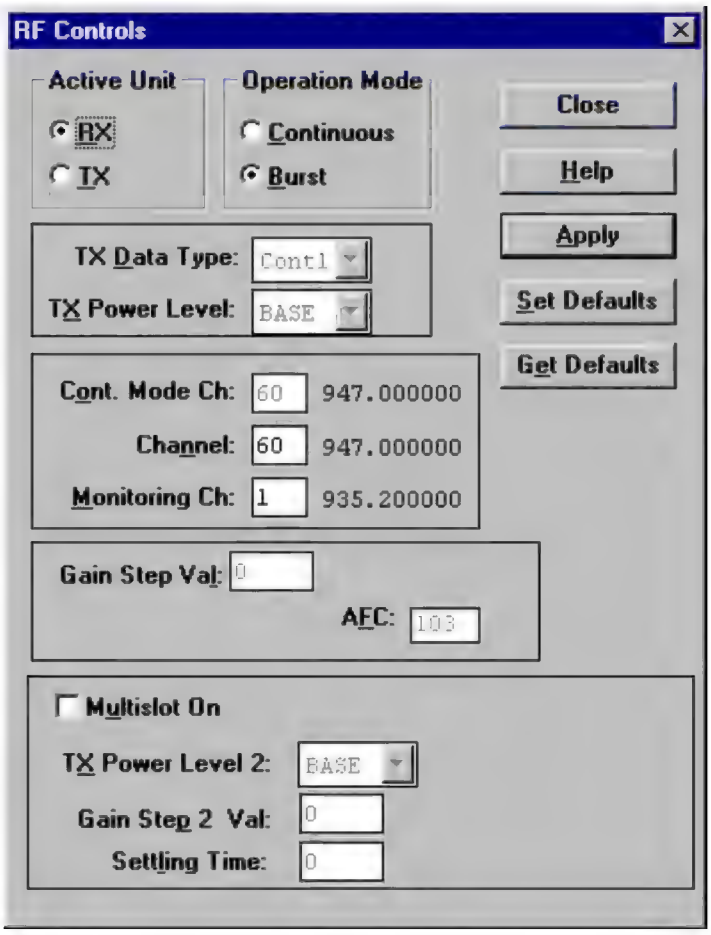

Figure 31. RF Controls

Set Active unit to TX

Set TX Data Type: to Rand

Click Apply

Click Close

Select: Tuning Alt+t

TX Power... Alt+P

A window now pops–up (Figure 32):

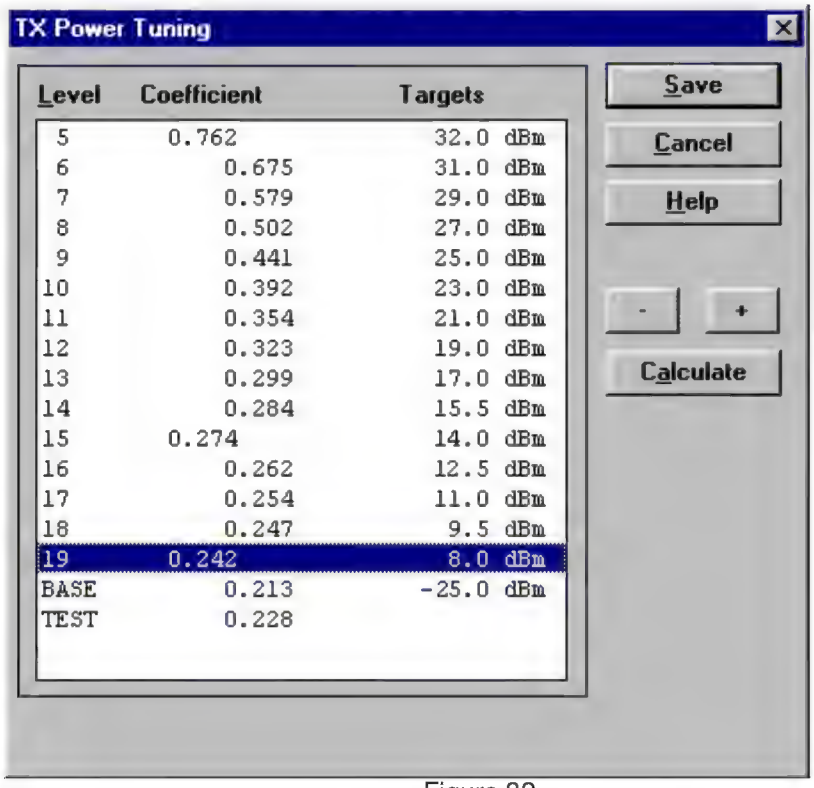

Figure 32.

Tune levels 19, 15, 5 and Base in accordance with the target values.

Click calculate, check if the other levels match the targets, correct if necessary.

Click Save when all values matches the targets.

PCN tuning

Select: Product Alt+p
Band b
PCN p
Select: Testing Alt+e
RF Controls r

A window now pops–up (Figure 33):

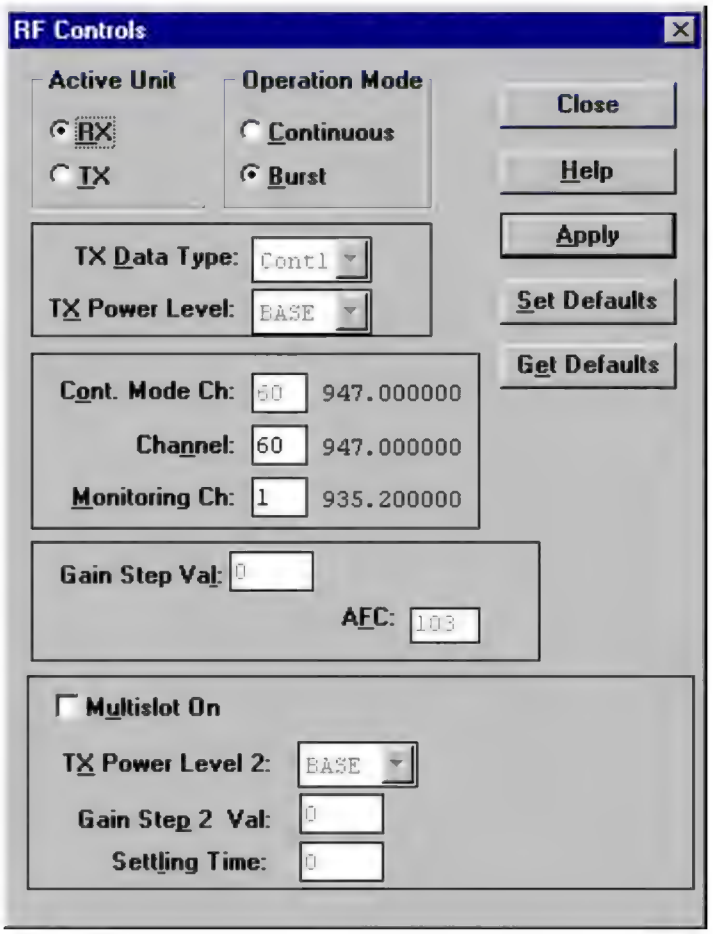

Figure 33.

Set Active unit to TX
Set TX Data Type: to Rand
Click Apply
Click Close
Select: Tuning Alt+t
TX Power… Alt+P

A window now pops–up:

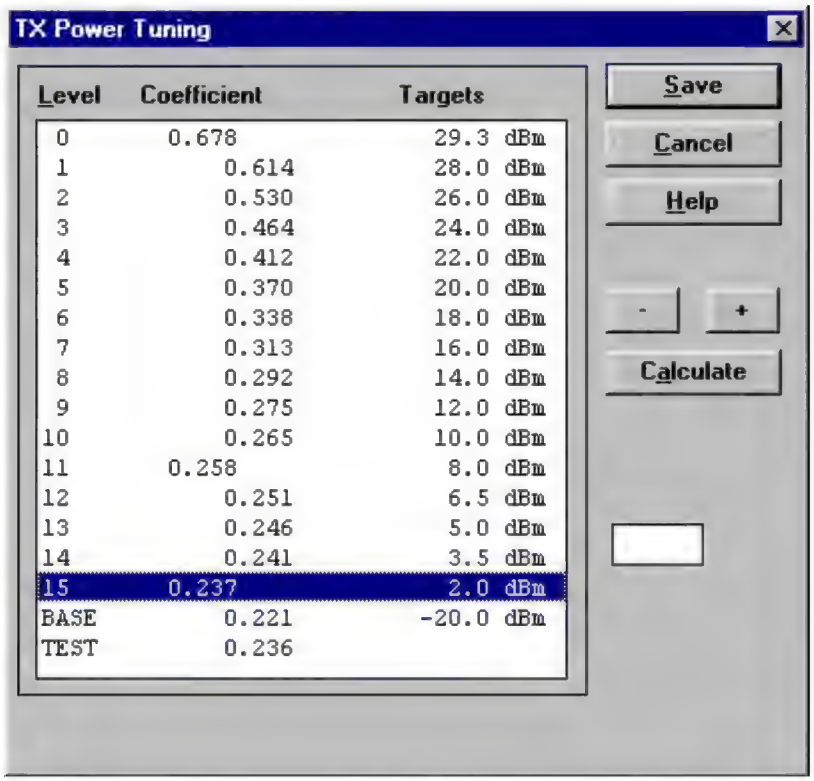

Figure 34.

Tune levels 15, 11, 0 and Base in accordance with the target values.

Click calculate, check if the other levels match the targets, correct if necessary.

Click Save when all values matches the targets.

TX I/Q Tuning

This tuning must be done in both bands.

Select:	Product	Alt+p
	Band	b
	EGSM	e
Select:	Testing	Alt+e
	RF Controls	r

A new pop up window appears

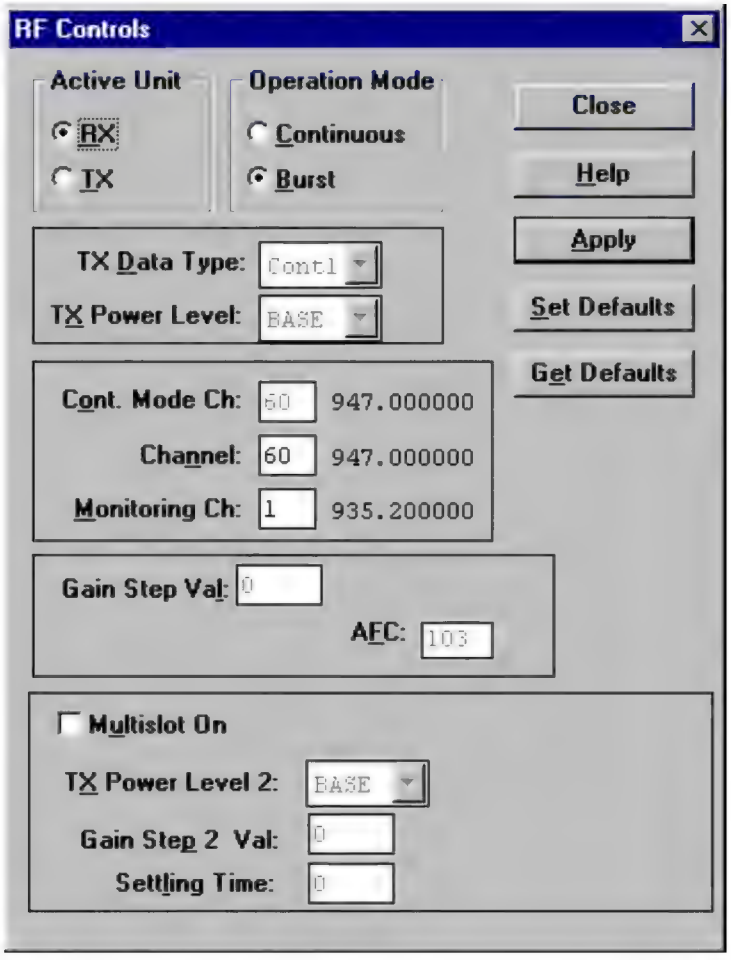

Figure 35.

Set Active unit to TX

Set TX Data Type: to Cont1

Click Apply

Click Close and continue to next stage

Common tuning procedure

Select: Tuning Alt+t

TX I/Q... Alt+q

A window now pops–up (Figure 36) :

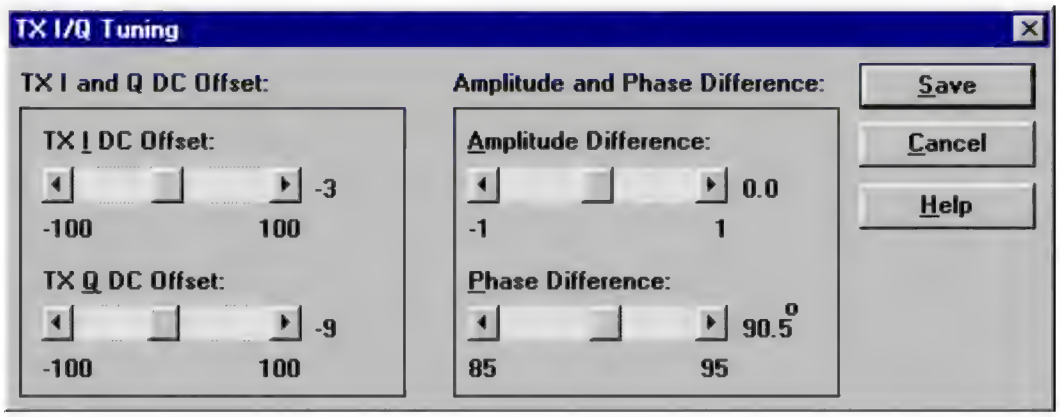

Figure 36.

The carrier and +67kHz signal should now be tuned to a minimum. (Figure 37)

The buttons in the "TX I and Q DC Offset:" will change the level of the carrier.

The buttons in the "Amplitude and Phase Difference:" window will change the level of the +67kHz signal.

When minimum values are reached, click Save.

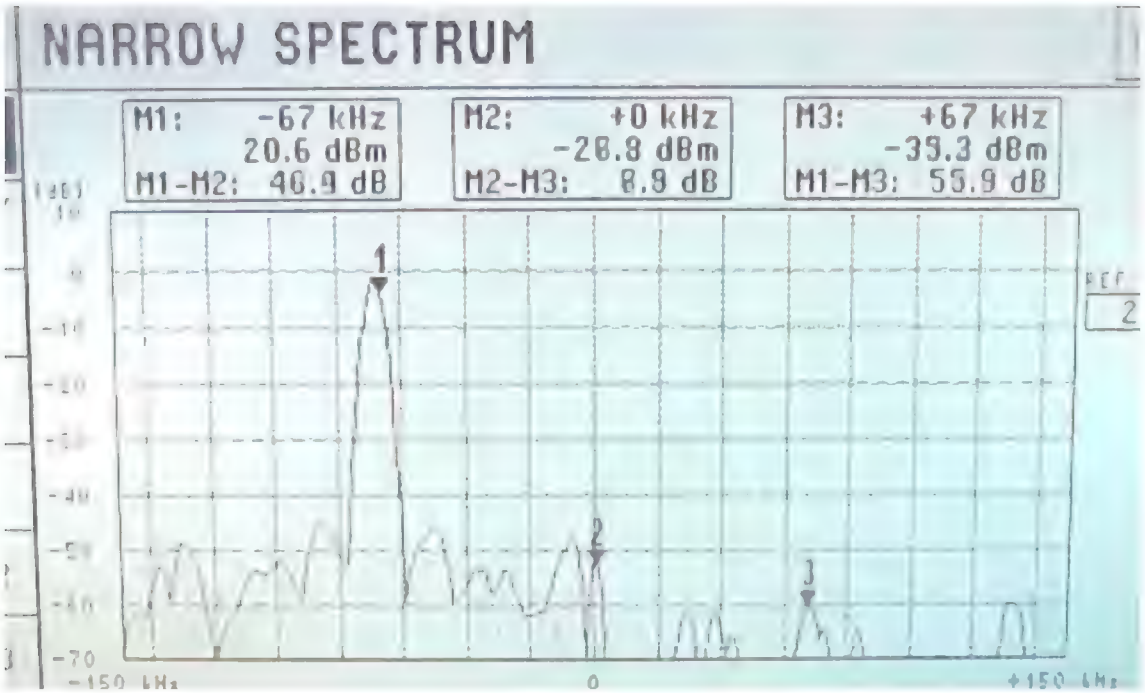

Figure 37.

Initial set–up PCN

Select:	Product		Alt+p
		Band	b
			PCN p
Select:	Testing		Alt+e
		RF Controls	r

A window now pops–up (Figure 38):

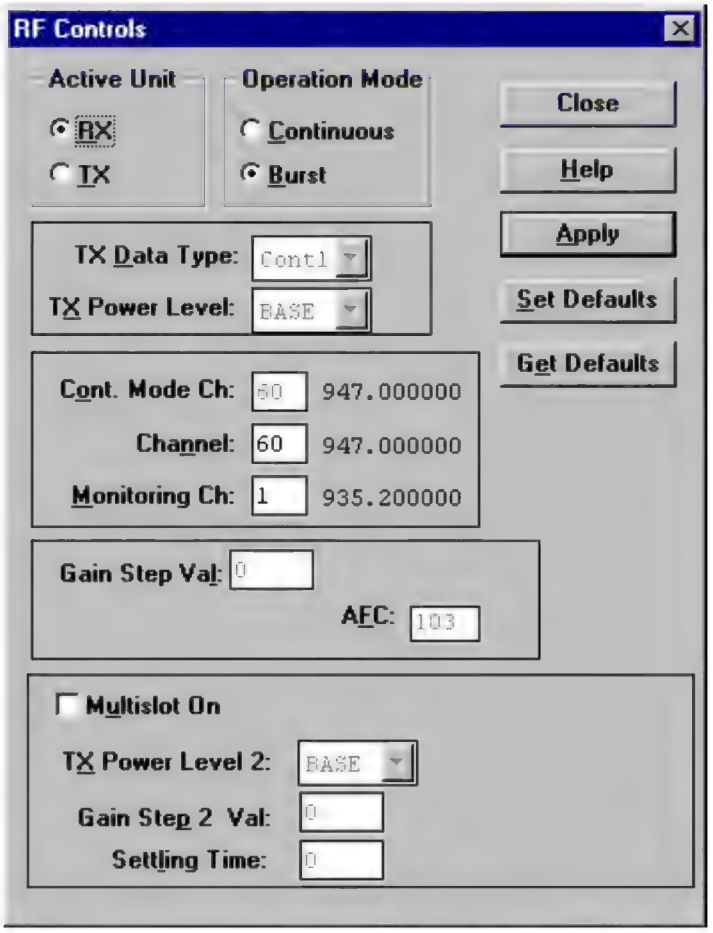

Figure 38.

Set Active unit to TX

Set TX Data Type: to Cont1

Click Apply

Click Close and continue to next section

IQ Tuning using Spectrum Analyzer

EGSM

Spectrum Analyzer Settings

Use an appropriate attenuator 10 or 20dB insertion loss and set the Reference Level Offset according to insertion loss from the phone to the Spectrum Analyzer.

Set the Spectrum Analyzer according to the following settings.

Parameter	EGSM
Center frequency	902 MHz
Frequency span	300 kHz
Resolution Bandwidth	3 kHz
Video Bandwidth	3 kHz
Sweep time	3 s
Detector type	Max. peak
reference level	35 dBm
Marker 1	902.06771 MHz
Marker 2	902 MHz
Marker 3	901.93229 MHz

Phone Settings

Connect the phone to the computer and to the Spectrum Analyzer.

Using WinTesla to select the following:

Product

Band

EGSM

This selects the EGSM band. Then select the following:

Testing

RF Controls…

A window pops up (Figure 39):

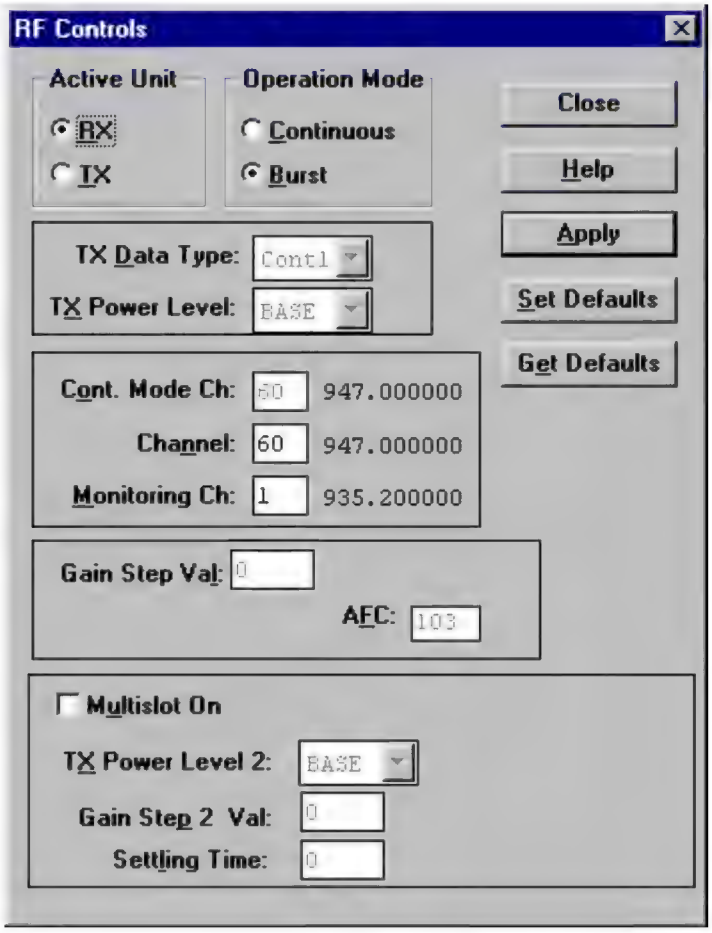

Figure 39.

Set "TX Data Type" to "Cont1", press "Apply", then press "Close". The window closes.

Select the following:

Tuning

Tx I/Q...

A window pops up:

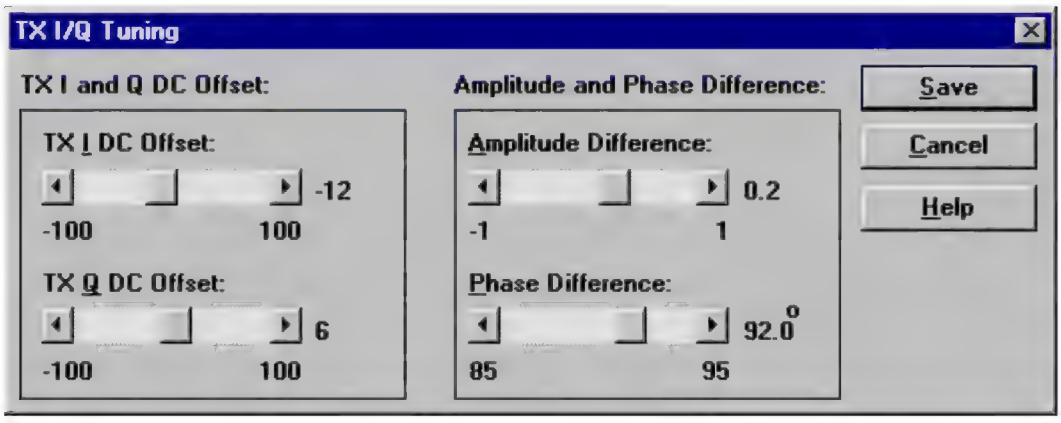

Figure 40.

This is the ”Tx I/Q Tuning” window.

Set the Power Level to ”10”. Then the Spectrum Analyzer shows a plot like this (Figure 41):

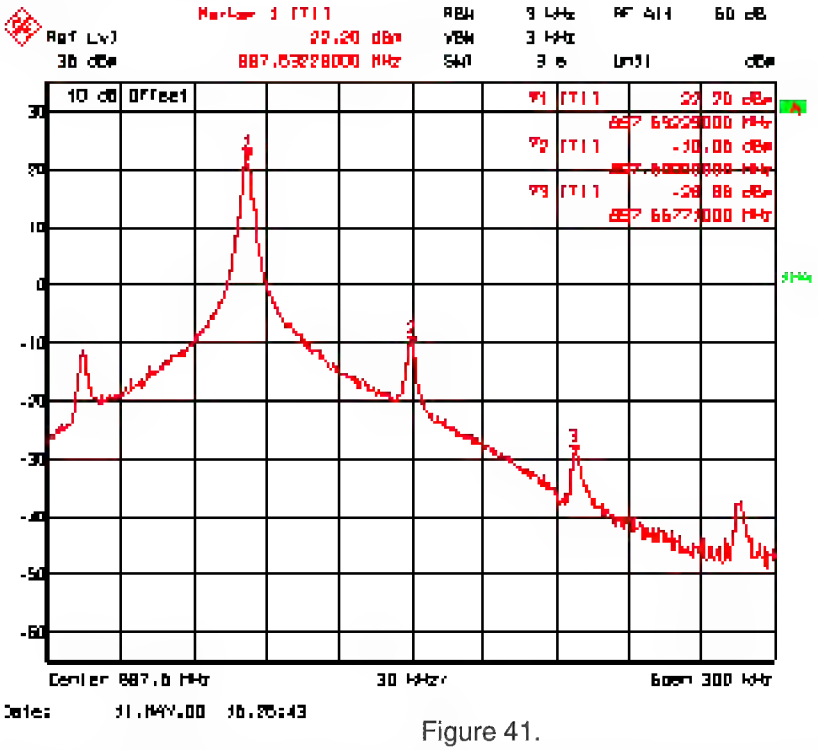

Figure 41.

Marker 1 shows the wanted signal. Marker 2 and marker 3 show the unwanted signals.

In the ”Tx I/Q Tuning” window use ”TX I DC Offset” and ”TX Q DC Offset” to adjust the spurious at 902.0MHz (Marker 2) to the minimum level.

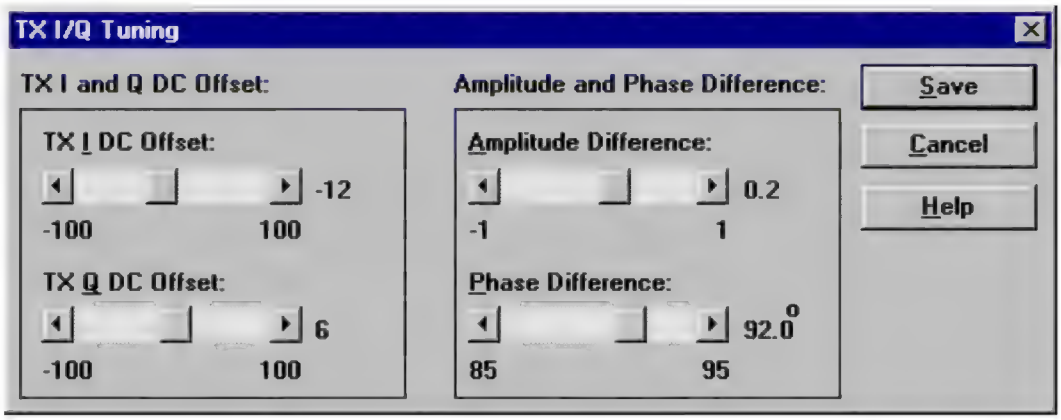

Figure 42.

Then the Spectrum Analyzer shows a plot like this (Figure 43):

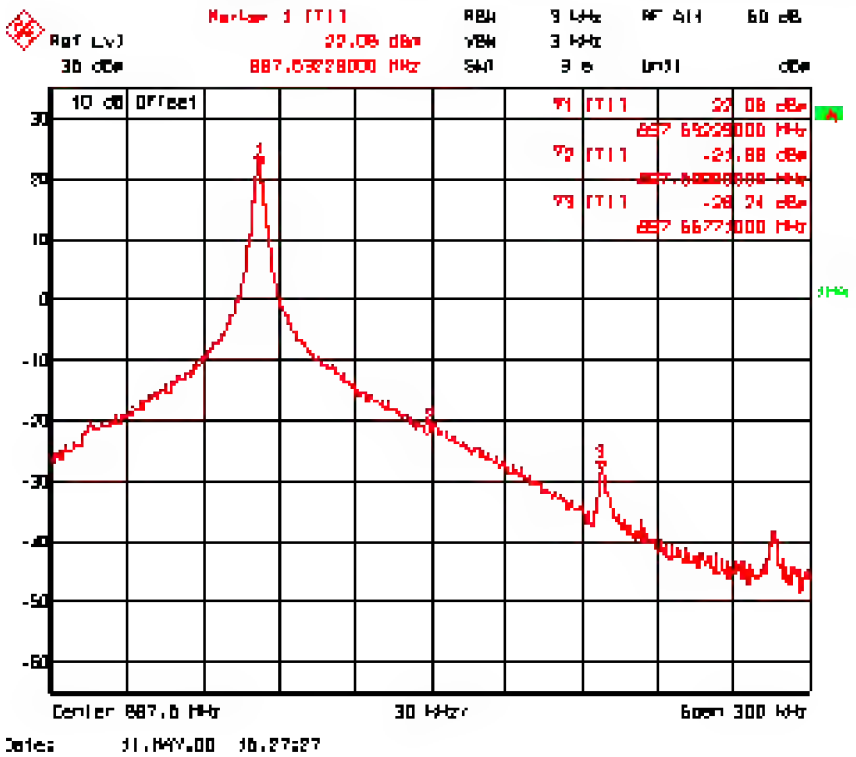

Figure 43.

In the ”Tx I/Q Tuning” window use ”Amplitude Difference” and ”Phase Difference” to adjust the spurious at 901.93229 MHz (Marker 3) to the minimum level.

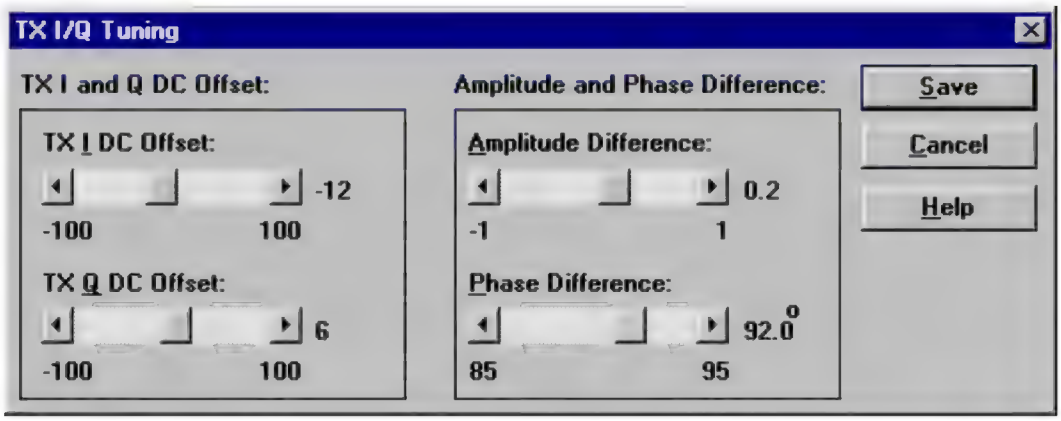

Figure 44.

Then the Spectrum Analyzer shows a plot like this (Figure 45):

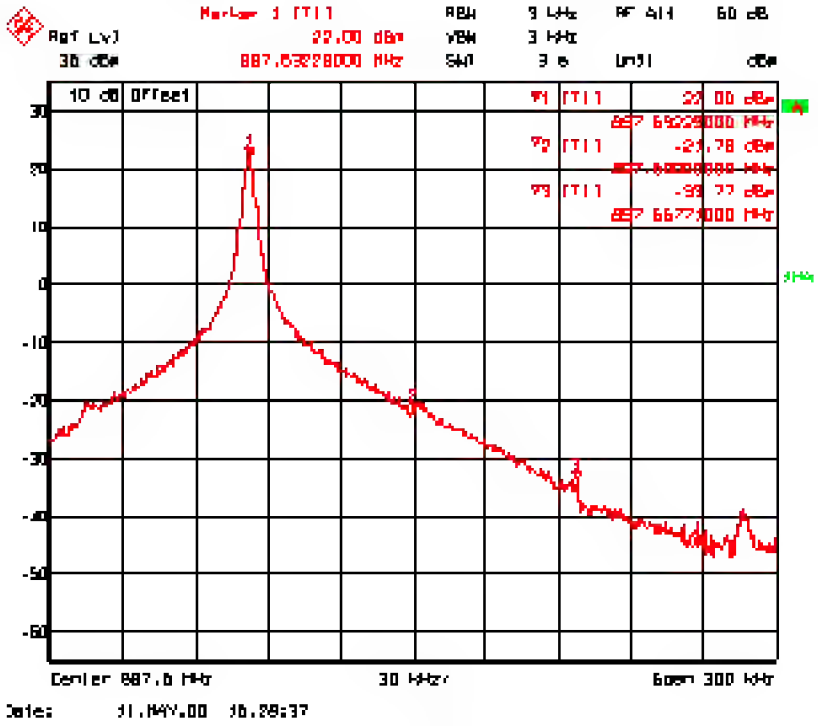

Figure 45.

In the ”Tx I/Q Tuning” window press ”Save” and the optimal values are stored in the phone. The window closes.

Note: The optimal values for ”TX I and Q Offset” and ”Amplitude and Phase Difference” vary from phone to phone.

PCN

Spectrum Analyzer Settings

Use an appropriate attenuator 10 or 20dB insertion loss and set the Reference Level Offset according to insertion loss from the phone to the Spectrum Analyzer.

Set the Spectrum Analyzer according to the following settings.

Parameter	PCN
Center frequency	1747.8 MHz
Frequency span	300 kHz
Resolution Bandwidth	3 kHz
Video Bandwidth	3 kHz
Sweep time	3 s
Detector type	Max. peak
reference level	35 dBm
Marker 1	1747.73229 MHz
Marker 2	1747.8 MHz
Marker 3	1747.86771 MHz

Phone Settings

Connect the phone to the computer and to the Spectrum Analyzer.

Using WinTesla to select the following:

Product

Band

PCN

This activates the PCN band. Then select the following:

Testing

RF Controls...

A window pops up:

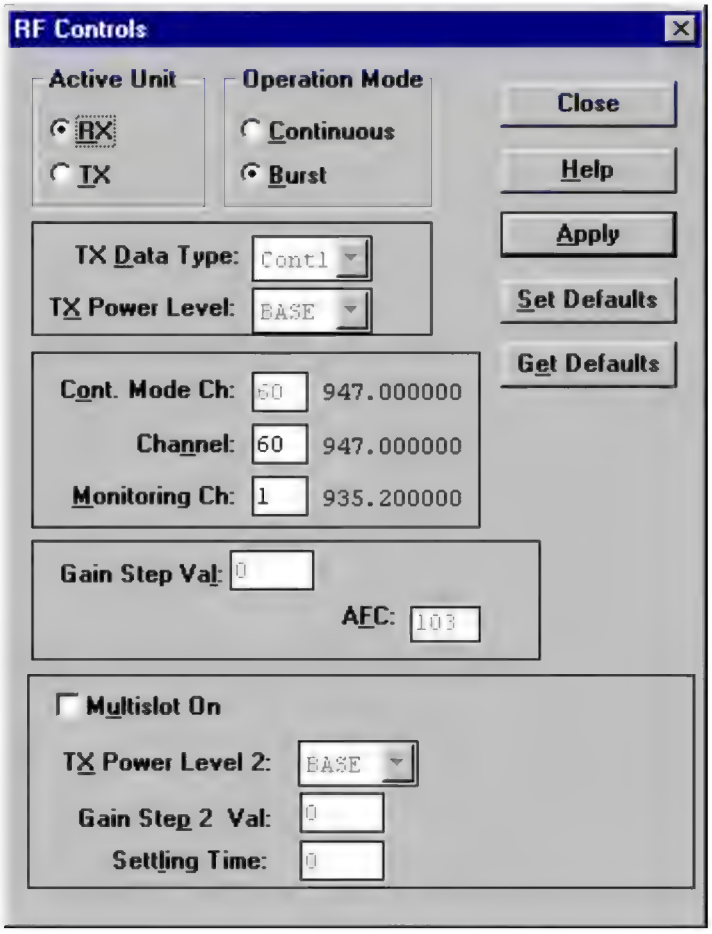

Figure 46.

Set "TX Data Type" to "Cont1", press "Apply", then press "Close". The window closes.

Select the following:

Tuning

Tx I/Q...

A window pops up:

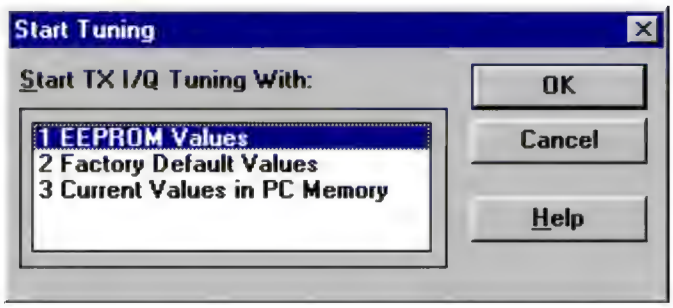

Figure 47.

Select "EEPROM Values" and a new window pops up:

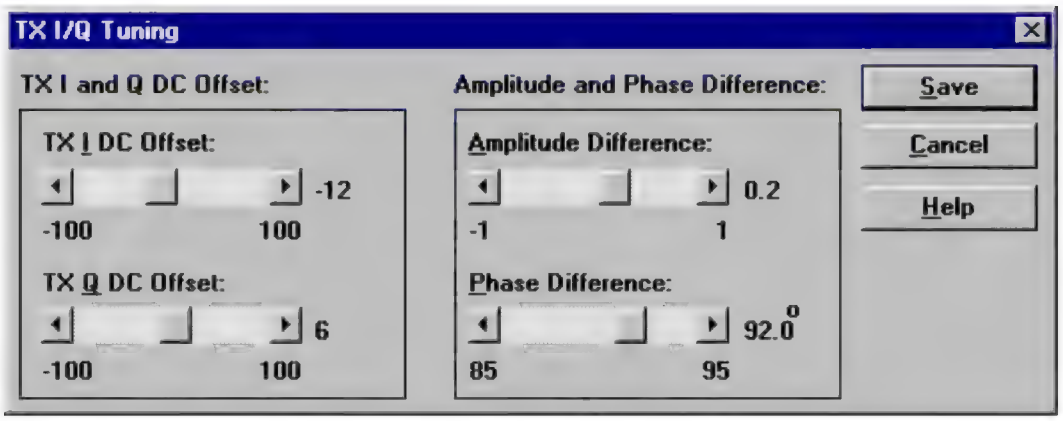

Figure 48.

This is the ”Tx I/Q Tuning” window.

Set the Power Level to ”5”. Then the Spectrum Analyzer shows a plot like this (Figure 49):

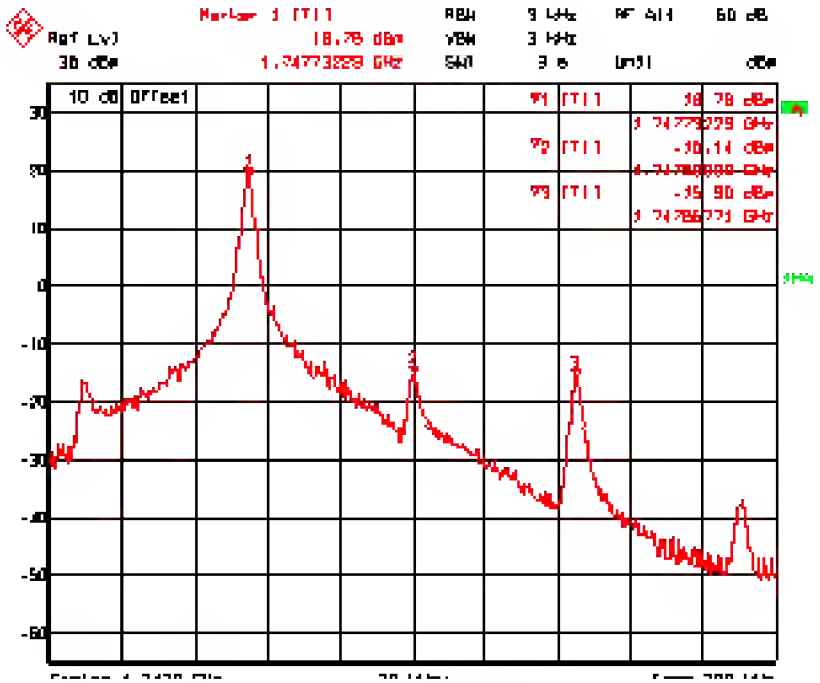

Figure 49.

In the "Tx I/Q Tuning" window use "TX I DC Offset" and "TX Q DC Offset" to adjust the spurious at 1747.8MHz (Marker 2) to the minimum level.

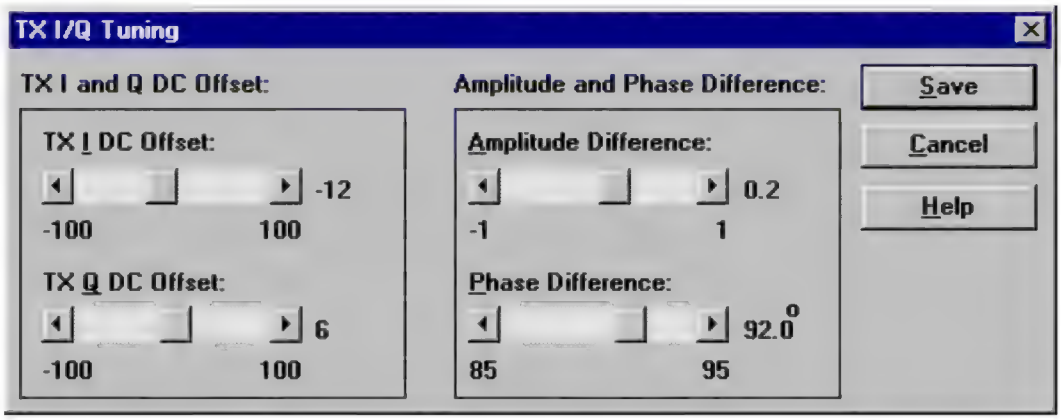

Figure 50.

Then the Spectrum Analyzer shows a plot like this (Figure 51):

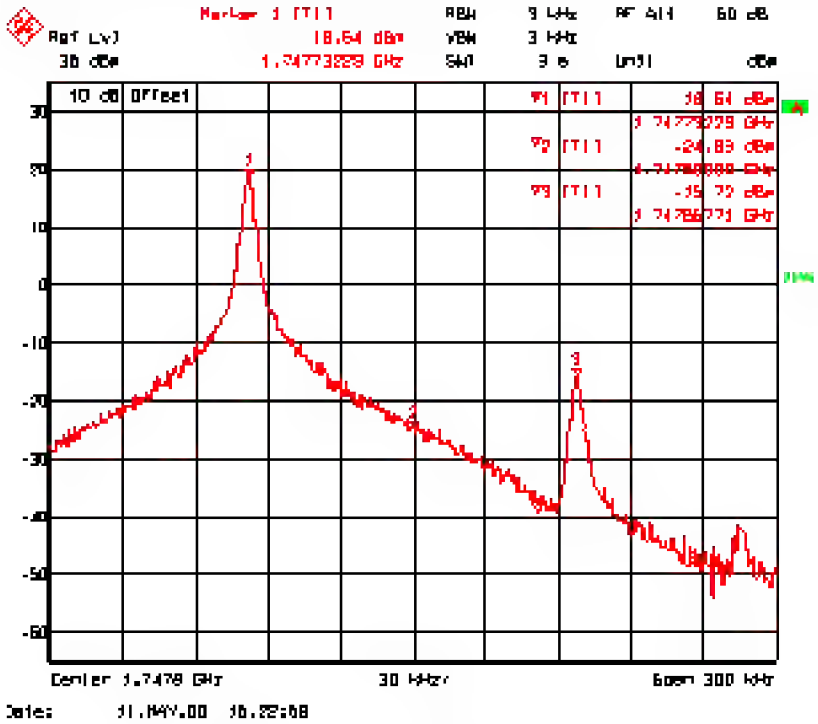

Figure 51.

Marker 1 shows the wanted signal. Marker 2 and marker 3 show the unwanted signals.

In the ”Tx I/Q Tuning” window use ”Amplitude Difference” and ”Phase Difference” to adjust the spurious at 1747.86771MHz (Marker 3) to the minimum level.

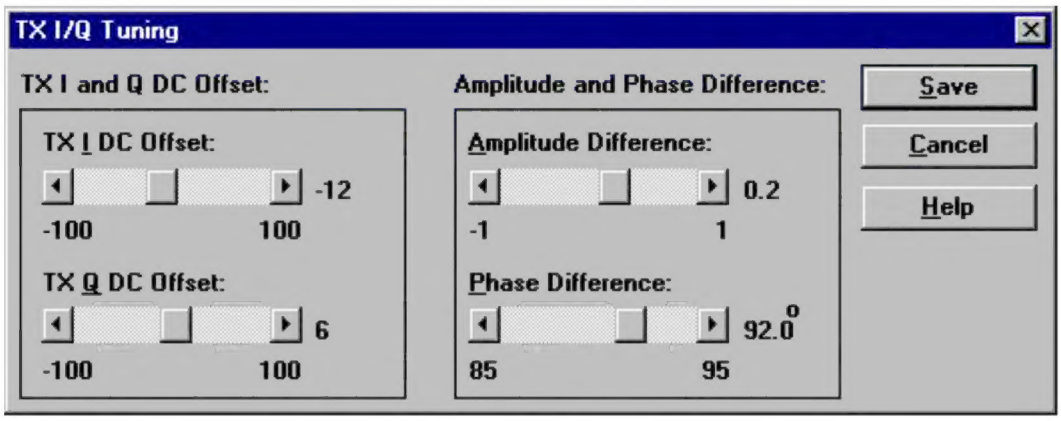

Figure 52.

Then the Spectrum Analyzer shows a plot like this:

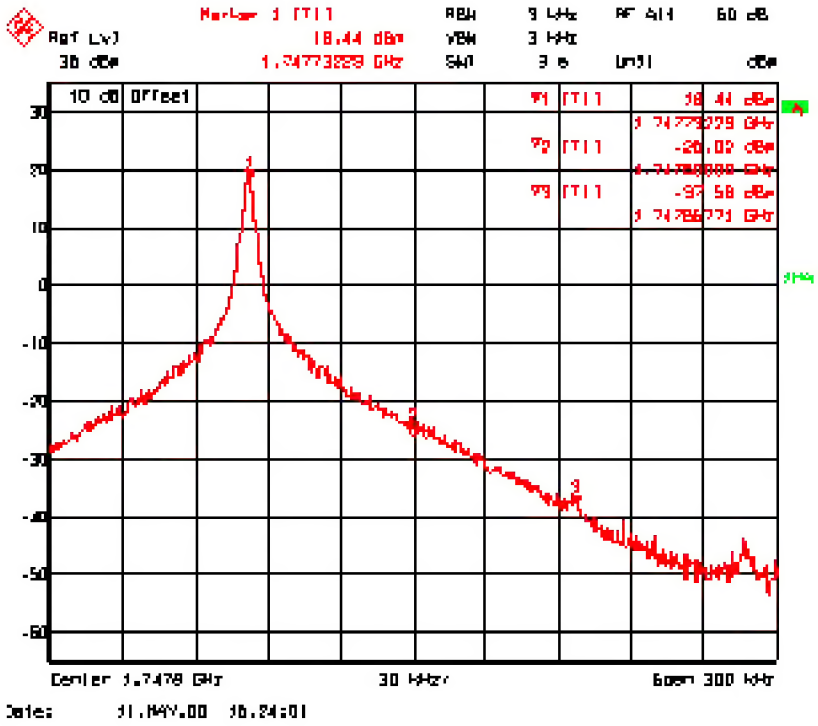

Figure 53.

In the ”Tx I/Q Tuning” window press ”Save” and the optimal values are stored in the phone. The window closes.

Note: *The optimal values for ”TX I and Q Offset” and ”Amplitude and Phase Difference” vary from phone to phone.*

Energy Management (EM) Calibration

Equipment Setup for Energy Management calibration

NOTE: EM values can not be tuned in module jig MJS–14

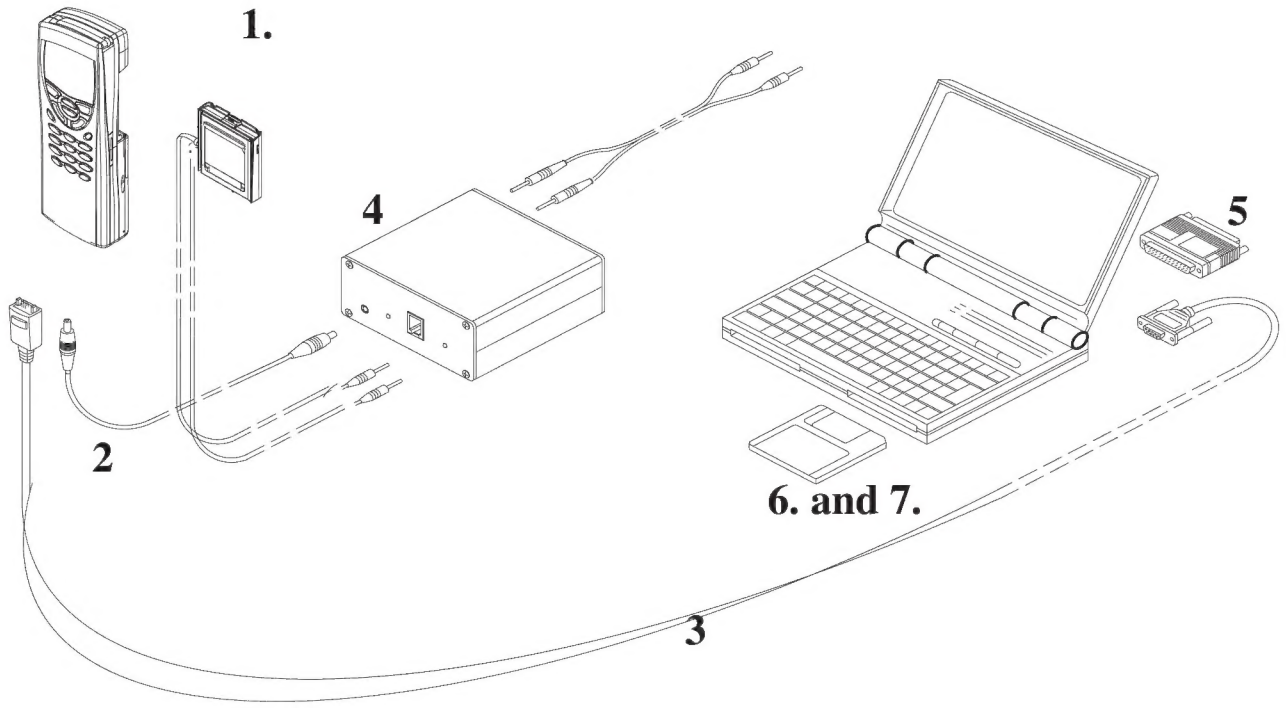

Figure 54. Tuning set–up 2

Item:	Service accessory:	Type	Product code:
1	Dummy Service Battery	BBL–3B	0770206
2	DC Cable	SCB–3	0730114
3	Service MBUS Cable	DAU–9C	0730138
4	Calibration unit	JBE–2	0775290
5	Software protection key	PKD–1	0750018
6	Service SW diskette 3.5” for Wintesla		0774046
7	Service SW CD for RAE–3		0775291

Energy Management Calibration procedure

NOTE: This can not be done in module jig MJS–14. EM calibration is possible only when phone is completely assembled.

– Connect DAU-9C cable and BBL-3B battery to RAE–2N phone
– Connect BBL-3B to the calibration unit JBE-2 and DC cable SCB-3 between phone and calibration unit.
– Connect JBE-2 to laboratory power supply which is adjusted to 8.0V
– Start Wintesla service SW
– Select Tuning –> Energy Management Calibration

– Run calibrations separately or all at once as described in the following list. Connect 10.5V to the calibration unit JBE-2 as prompted by service SW.

– Select calibrations:

– Select 1.Run Battery & charger default values checkbox

– Select 2.Battery voltage checkbox

– Select 3.Charger voltage checkbox

– Select 4.Battery size checkbox

– Select 5.Battery temperature checkbox

– Select 6.Charge current

– Select Save without confirmation, if you don't want

confirm all the selected calibration values before saving

– Run calibrations by pressing Run button

– Set supply voltage back to 8.0 V

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